Series 1958, No. 18

Issued December 1961

SOIL SURVEY

Crawford County Wisconsin

OUR SOIL ★ OUR STRENGTH

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
UNIVERSITY OF WISCONSIN
Wisconsin Geological and Natural History Survey
Soil Survey Division
and
Wisconsin Agricultural Experiment Station

HOW TO USE THE SOIL SURVEY REPORT

THIS SURVEY of Crawford County will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; serve as a reference for students and teachers; help prospective farmers, land appraisers, bankers, and real estate agents to decide the worth of a particular farm; and will add to the soil scientist's fund of knowledge.

In making this soil survey, soil scientists walked over the county. They dug holes and examined surface soils and subsoils; measured slopes with a hand level; noticed differences in the growth of crops, weeds, and grasses; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming, engineering, and related uses.

The scientists plotted the boundaries of the soils on aerial photographs. Then, from the photographs, cartographers prepared the detailed soil map in the back of this report. Fields, woods, roads, streams, and many other landmarks can be seen on the map and are helpful in locating the area in which you are interested.

This soil survey is part of the technical assistance furnished by the Soil Conservation Service to the Crawford County Soil Conservation District. Work on the survey was completed in 1958. Unless otherwise indicated all statements refer to conditions at the time the survey was in progress.

Locating the soils

Use the "Index to Map Sheets" at the back of this report to locate areas on the large map. The index is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located. When the correct sheet of the large map has been located, it will be seen that boundaries of the soils are outlined and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. The symbol will be inside the area if there is enough room; otherwise, it will be outside the area and a pointer will show where the symbol belongs.

Finding information

Some readers will be more interested in one part of the report than in another, for the report has special sections for different groups, as well as sections that may be of value to all. The introductory part, which discusses general geographic features of the county, the climate, the kinds of vegetation, water supplies, settlement, industries, transportation, and wildlife, will be of interest mainly to those not familiar with the county. Those not familiar with the county may also want to refer to the sections "General Soil Areas" and "Agriculture."

Farmers and those who work with farmers will be interested mainly in the section "Descriptions of Soils" and in the section "Use and Management of the Soils." Study of these sections will aid them in identifying soils on a farm, in learning ways the soils can be managed, and in judging what yields can be expected. The "Guide to Mapping Units" at the back of the report will simplify use of the map and the report. This guide gives the map symbol for each soil, the name of the soil, the page on which the soil is described, the capability unit in which the soil has been placed, and the page where the capability unit is described.

Engineers will want to refer to the section "Engineering Properties of the Soils." Tables in that section show characteristics of the soils that affect engineering.

Soil scientists will find information about how the soils were formed and how they were classified in the section "Formation, Classification, and Morphology of the Soils."

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interest.

U.S. GOVERNMENT PRINTING OFFICE: 1961

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington 25, D.C.

Contents

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SOIL SURVEY OF CRAWFORD COUNTY, WISCONSIN

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CRAWFORD COUNTY is in the southwestern part of Wisconsin. It is in the Driftless Area, or unglaciated part of the State (fig. 1). The county is bounded on the south by the Wisconsin River, beyond which is Grant County. On the east it is bounded by Richland County, and on the north, by Vernon County. The Mississippi River forms the western boundary and separates the county from the State of Iowa.

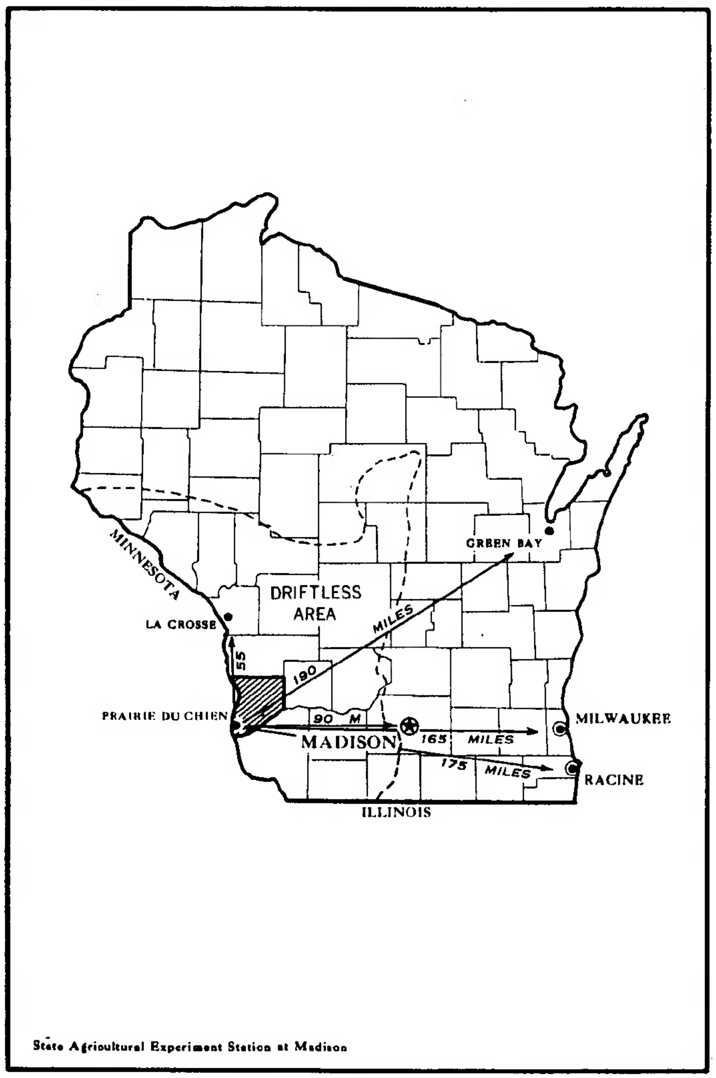

***Figure 1.*—Location of Crawford County and of the Driftless Area of Wisconsin.**

The land area of the county is 586 square miles, or 375,040 acres. Rivers, lakes, and other areas covered by water account for an additional 14 square miles, or 8,960 acres. The county has 11 civil townships. Prairie du Chien, the county seat, is 3 miles above the place where the Wisconsin River flows into the Mississippi.

Description of the County

This section describes the general geographic features of the county, the climate, the kinds of vegetation, and the water supplies. It also discusses the settlement, industries, transportation, and wildlife.

Physiography, Relief, and Drainage

Crawford County is in the Western Upland physiographic region of Wisconsin (*6*).[1] In general, the county is a deeply dissected plateau characterized by rolling ridges and by narrow, steep-sided valleys. Steep escarpments face the Mississippi and Wisconsin Rivers.

Two main ridges, separated by the valley of the Kickapoo River, run from north to south through the county. The larger of these two ridges is between the Mississippi and Kickapoo Rivers. It is almost continuous and extends from Prairie du Chien in the southern part of the county northward for 80 miles to the town of Sparta, in Monroe County. Geologic erosion has cut laterally into both of the ridges. As a result, many secondary ridges, which generally run from east to west, have formed. The elevation of the ridges ranges from 1,283 feet at Rising Sun, which is in the northern part of the county, to 1,212 feet at White Corners in the southern part (*10*).

The bottoms of the valleys are 300 to 500 feet lower than the crests of the ridges. The bottoms in the valley of the Kickapoo River are as much as one-half mile wide. Those of the valleys of secondary streams are narrow and have steep sides. The terraces vary considerably. In the valley of the Kickapoo River, they are as much as one-half mile wide. The secondary valleys have terraces generally only in the lower ends of the valleys.

Most of Crawford County is well drained. The Mississippi, which flows along the western boundary of the county, is the largest river draining the area. The Wisconsin River flows along the southern boundary. It

[1] Italic numbers in parentheses refer to Literature Cited, p. 81.

drains the eastern part of the county and carries water from the Kickapoo River to the Mississippi River.

The Kickapoo River runs through the county in a north-south direction. Its tributaries flow into it from the east or west and generally form a blocky pattern. This blocky pattern was probably set in geologic times. During those times, streams followed cracks in the underlying limestone that has broken into large rectangular blocks. All of the smaller streams on the western side of the county flow west to the Mississippi River.

Geology

Crawford County is in the unglaciated part of Wisconsin. Therefore, the kind of bedrock is important in determining the relief and the kinds of soils and their distribution. In this county the bedrock is of two kinds—sandstone and dolomitic limestone. It is made up mainly of Franconia and Trempealeau sandstones of the Cambrian period and of Prairie du Chien, Platteville, Decorah, and Galena limestones and St. Peter sandstone of the Ordovician period. Also, in small areas near Seneca, there are outcrops of cherty and gravelly Cretaceous rocks containing some iron oxide. The distribution of the various formations in the county is shown in figure 2; the relation of the soils to the landscape is shown in figure 24, in the section "Formation, Classification, and Morphology of the Soils."

Throughout the county, wherever the dolomite has been removed, the bedrock is Cambrian sandstone. The

***Figure 2.*—Legend for geologic map of Crawford County, Wis. The Trempealeau and Franconia formations are of the Cambrian period, but all of the other formations are of the Ordovician period.**

1. **Galena dolomite (Prosser member); Decorah dolomite and shale; Platteville dolomite.**
2. **St. Peter sandstone.**
3. **Prairie du Chien dolomite.**
4. **Trempealeau sandstone; Franconia sandstone.**

sandstone is as much as 1,000 feet thick and is softer than the dolomite. In the northern part of the county, streams have cut deeper into the sandstone than in other parts of the county, and the formations are easily seen.

The uppermost 100 to 300 feet of Cambrian sandstone consists of sandstone of the Franconia and Trempealeau formations. These formations underlie the soils on valley slopes. The Franconia formation, which underlies the Trempealeau, contains notable amounts of greenish, glauconitic fine sand and silt and some micaceous clay (fig. 3). Sandstone of the Franconia formation erodes more easily than that of the Trempealeau formation. Therefore, the valley slopes are steep near the top and concave farther down the slope. Still farther down the slope, near the bottom lands, they flatten out.

Prairie du Chien dolomitic limestone underlies the long, narrow ridges in all parts of the county. The nearly level bedding of the dolomite, which forms a cap over the sandstone of the Trempealeau formation, causes the ridges to be nearly level on top. The dolomite is hard and resists erosion. As a result, steep escarpments and deep valleys have formed in areas where the dolomite lies above less resistant materials. Only as the dolomite cracks and falls into the valleys can streams and gullies move farther back into the uplands.

On most of the larger ridges, St. Peter sandstone overlies the Prairie du Chien dolomite. In these areas the topography is gently rolling. St. Peter sandstone (fig. 4) is soft and is medium grained to coarse grained; it is red, white, brown, or yellow. Because of past geologic erosion, the thickness of the sandstone varies.

Limestone of the Platteville, Decorah, and Galena formations underlies the ridges from Seneca south to Prairie du Chien. It also underlies Harris Ridge in the southeastern part of the county. In the uppermost parts of these formations are fossils and seams of shale. The topography is dominated by ridges, which are nearly level on top, and by steep escarpments. It is similar to that in the areas underlain by Prairie du Chien dolomite.

In most parts of the county, windblown silt, or loess, was blown onto the uplands from the flood plains of the Mississippi River. The silt was deposited during and after periods of glaciation. The deep, silty soils of

***Figure 3.*—Roadcut through sandstone of Franconia formation that is interbedded with siltstone, sandstone, and shale.**

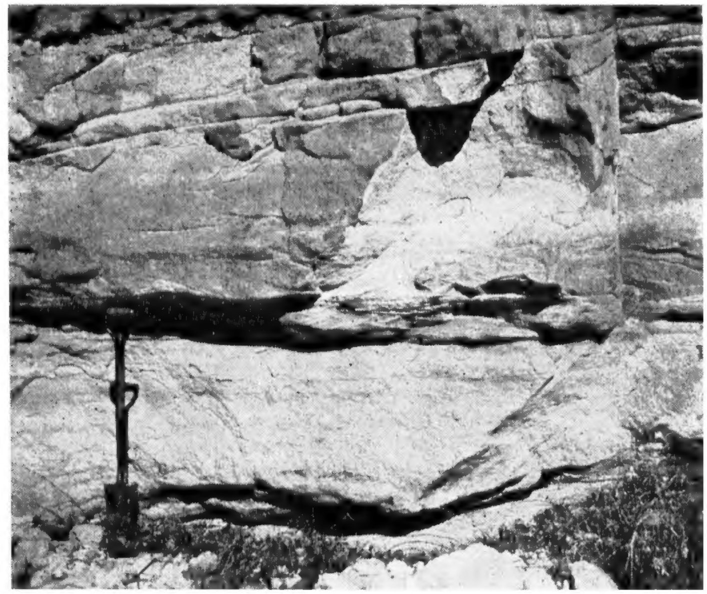

***Figure 4.*—St. Peter sandstone exposed in a roadcut; strata of many different colors are within the formation.**

the uplands have formed in this loess. In some areas the layer of loess is fairly thin or is absent. In these places the soils have formed in sandy outwash or in materials weathered from bedrock. In many places, where the layer of loess is thick, the soils formed entirely in loess and are not closely related to the bedrock. Near the Mississippi River the loess is as much as 20 feet thick, but farther back from the river it is only 1 to 2 feet thick. Originally, the loess was believed to have been calcareous. Now, the calcareous materials have leached out to a depth of about 5 feet or more. As a result, soils that have formed in loess are acid.

Some of the soils of the valley slopes, stream terraces, and bottom lands have also been influenced by loess. In some of these areas, the loess was probably laid down at the same time loess was deposited on the uplands. The bottom lands, however, still receive loess deposited as silt by runoff from the uplands.

Climate

The climate of Crawford County is of a humid-continental type. It is marked by wide extremes of temperature within seasons as well as between seasons. The periods of coldest weather in winter and of hottest weather in summer generally last for 2 or 3 days. Table 1, compiled from records of the U. S. Weather Bureau at Prairie du Chien, gives climatic data for the county.

Precipitation is evenly distributed throughout the county. About 60 percent of the precipitation falls as rain during the growing season. The lowest annual rainfall—18.45 inches—was recorded in 1895. In winter, precipitation is chiefly in the form of snow and is generally heavy. The average annual snowfall ranges from about 33 inches at Prairie du Chien to 48 inches at Gays Mills. Normally, the rainfall is adequate for most crops commonly grown in the county. In years of low rainfall, however, yields of crops are limited by lack of moisture,

TABLE 1.—*Temperature and precipitation at Prairie du Chien, Crawford County, Wis.*

[Elevation, 682 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1895)	Wettest year (1938)	Average snowfall
	° F.	° F.	° F.	Inches	Inches	Inches	Inches
January	17. 9	66	−37	1. 11	1. 45	1. 33	8. 7
February	21. 1	65	−32	1. 11	. 50	2. 34	6. 8
March	33. 8	89	−12	1. 80	. 61	3. 38	6. 9
April	48. 4	94	12	2. 54	. 55	3. 26	1. 4
May	60. 0	109	23	3. 70	3. 12	4. 41	(3)
June	69. 2	105	34	4. 17	1. 67	6. 26	(3)
July	74. 0	110	38	3. 55	1. 44	4. 49	(3)
August	71. 3	106	35	3. 94	2. 09	6. 02	0
September	63. 9	104	20	3. 96	2. 48	9. 46	0
October	51. 8	89	4	2. 18	. 95	1. 02	. 1
November	36. 6	84	−8	1. 86	1. 55	2. 84	2. 5
December	23. 7	62	−26	1. 30	2. 04	. 89	6. 8
Year	47. 6	110	−37	31. 22	18. 45	45. 70	33. 2

[1] Average temperature based on a 70-year record, through 1955; highest and lowest temperatures on a 62-year record, through 1952.
[2] Average precipitation based on a 75-year record, through 1955; wettest and driest years based on a 73-year record, in the period 1837–1955; snowfall based on a 61-year record, through 1952.
[3] Trace.

particularly on the shallow soils and on soils on the terraces along the major rivers.

The average frost-free season is 166 days, but it ranges from 110 days in the northern part of the county to 207 days at Prairie du Chien. Because of differences in elevation, local variations in the length of growing season occur. Generally, the ridges have a longer frost-free season than areas on the bottom lands because the soils have better drainage. Although the growing season is generally short, it is long enough for corn and other commonly grown crops to mature.

Native Vegetation

Most of Crawford County lies within an area, called a tension zone, in which minor changes in environment may cause changes in the vegetation. For example, if the climate becomes cooler or wetter than it is at the present time, the forests will encroach upon the prairie areas. On the other hand, if the climate becomes drier or warmer, the prairie grasses will encroach upon the forests.

About 85 percent of the original vegetation of Crawford County was hardwoods, 10 percent was prairie grasses, and the rest consisted of plants that grow in swamps and marshes (*2*). On the uplands the forests were made up chiefly of white oak and black oak, but there were a few scattered shagbark hickory, bitternut hickory, maple, basswood, walnut, birch, poplar, elm, and cherry trees. Near Rolling Ground and Horrigan Ridge, sugar maple and basswood were the principal kinds of trees. On the bottom lands the trees consisted mainly of soft maple, willow, elm, and river birch. Sedges and reeds grew in the marshes (*7*).

The largest prairie areas in the county were on the terrace upon which Prairie du Chien is now located and on the ridge near Mt. Sterling. Smaller areas of prairie were scattered throughout the county on valley slopes and stream terraces. The native vegetation was tall grasses, mainly bluestem (*Andropogon* sp.) and needle grasses (*Stipa* sp.).

Water Supply

Most of the geologic formations underlying the soils in Crawford County contain water. Therefore, the county has an abundant supply of underground water (*9*). In the uplands the Upper Cambrian sandstone, the Prairie du Chien dolomite, and the St. Peter sandstone are the principal sources of water, which is at a depth of 100 to 400 feet. In the valleys the sand, silt, and gravel of the alluvial deposits contain water, which can be obtained at a depth between 10 and 40 feet. Water can be obtained at a greater depth by drilling into the Upper Cambrian sandstone. There are many flowing wells along the Mississippi and Wisconsin Rivers, but few along the Kickapoo River. Springs occur throughout the county and are the source of many small streams. The water obtained from wells and springs is hard because it contains from 200 to 300 parts per million of calcium carbonate. The content of minerals is moderate.

At this time only a small acreage is irrigated, but irrigation could be extended in areas where the soil is sandy. In dry years crops on some of the sandy terrace soils along the Kickapoo River and near Prairie du Chien are sometimes damaged by drought. They would respond well to supplemental irrigation, and the nearby rivers would provide a good supply of water. In some places on the uplands, irrigation may be economically feasible; the cost of pumping water from the deep valleys to the uplands, however, would generally be prohibitive.

Settlement

The first settlement in Crawford County was at Prairie du Chien. In 1673, French explorers and missionaries—Marquette and Joliet—came down the Wisconsin River to a point near the present location of Prairie du Chien. Two years later, Hennepin and Du Lhut (Duluth) came down the Mississippi River from the north to that area. Because of the strategic location of the area, near both rivers, the French for many years used it to control transportation for the fur trade. Permanent settlement began in 1781 when three French Canadians purchased land from the Indians and built cabins at the place now named Prairie du Chien (*2*).

Crawford County was established in 1818. It included that part of the State east of the Mississippi River and about half of the present State of Wisconsin. In 1800, only 65 people lived in the area. Then, settlers from the eastern part of the United States began to arrive. By 1850, the population of the area had increased to about 2,500. Until 1851, the county included what is now La Crosse and Vernon Counties, but at that time the present boundaries of Crawford County were set. About 1851, immigrants began to come to the county from northern and central Europe. Most of the immigrants

settled on farms throughout the county. By 1950, the total population numbered more than 17,000, of which approximately 12,000 was classed as rural.

Industries

Most of the industries in the county are in or near Prairie du Chien. They consist of printing plants, cellulose and wood-processing plants, and of plants where metal is fabricated. There are also several plants where fertilizer is manufactured and sold, and others where sand and gravel are processed. Twelve sawmills are located in various parts of the county. Dairy products, mainly cheese, are processed in the plants that are in various parts of the county.

Transportation

Because of the location of Prairie du Chien near the place where the Wisconsin River joins the Mississippi, Crawford County has been a strategic area in the development of transportation routes (*2*). The Indians, French, British, and Americans used the area to control trade and military movements. One of the first overland routes, now U.S. Highway 18, was built westward from Prairie du Chien in 1835.

Until the first railroad was constructed in the county in 1857, most trade was carried on by the use of keelboats, which operated on the Mississippi River. Now, railroads and highways provide access to markets, and trade on the river has declined. Two railroads pass through Prairie du Chien. The Chicago, Burlington and Quincy Railroad runs along the entire western border of the county. The Chicago, Milwaukee, St. Paul and Pacific Railroad runs along the southern border from a point near Wauzeka to Prairie du Chien. Two Federal and six State highways traverse the county. Many of the county highways are paved, and many are surfaced with gravel.

Wildlife

The early settlers found an abundance of bear, deer, wild turkey, partridge, wolf, lynx, and bobcat in the rugged, forest-covered hills that make up much of Crawford County. Until about 100 years ago, the number of elk in the county was fairly large. When the land was cleared for farms, the natural habitats changed. Large game animals, predators, and wild turkeys moved out of the county. Today, squirrels are the primary game on the uplands, but cottontail rabbits, ruffed grouse, deer, and quail are also important. On the bottom lands are a few quail; pheasants, which are artificially stocked; ducks and geese; many muskrats; and a few mink. The county is primarily agricultural, and these species fit in well with agriculture.

Generally, squirrels like steep hillsides where oak and hickory trees predominate. Quail prefer bushy fence rows on the tops of ridges and protected areas along stream bottoms. Deer generally graze the borders of woodlands and travel through the bottom lands to water. Most of the game on the uplands is on the northern and eastern sides of the ridges. These areas are less droughty than the slopes on the southern and western sides and have a heavier growth of underbrush. Pheasants prefer the bottom lands. Because of flooding, however, such areas provide poor nesting sites. Ducks, geese, and furbearers inhabit the marshy wetlands along the Mississippi and Wisconsin Rivers.

***Figure 5.*—In this field that has been stripcropped, the odd-shaped areas have been planted to shrubs, trees, and other plants to provide food and cover for wildlife.**

Although hunting pressure in the county is great, in most places the wildlife population remains fairly constant, and in some places it is increasing. Large numbers of squirrels, rabbits, ruffed grouse, quail, and deer are taken by hunters each year. Hunters also obtain large numbers of ducks and geese, but the number of pheasants taken varies, depending on the rate of stocking. Many muskrats and a few mink are taken by trappers.

Most of the county is in farms; consequently, managing wildlife on a large scale is impractical. Much can be done on individual farms, however, to encourage wildlife. Corners and odd-shaped areas, for example, can be planted to shrubs, trees, or other kinds of plants to provide food and cover for wildlife (fig. 5). Also, areas along the bottoms of the Mississippi and Wisconsin Rivers could be diked to provide habitats for waterfowl and for furbearing animals.

General Soil Areas

In a county or other large tract, it is easy to see differences in the land as one travels from place to place. There are differences in the steepness, length, and shape of slopes; in the size and speed of the streams; in the kinds of native plants; and in the ways the soils are farmed or otherwise used.

After studying the soils and the way they are arranged, it is possible to make a general map that shows the main patterns of soils. Each general soil area, as a rule, contains a few major soils and several other minor soils in a pattern that is characteristic, although not strictly uniform. The soils within any one area are likely to differ greatly among themselves in some properties, for example, in slope, depth, stoniness, or natural drainage. Thus, the general map does not show the kind of soil at any particular place, but it gives a pattern that has in it several kinds of soils. The map is useful to people

Figure 6.—Legend for general soil map.

1. Gently sloping to steep, silty soils on uplands: Fayette, Dubuque.
2. Nearly level, sandy soils on terraces: Dakota, Sparta.
3. Silty soils on terraces: Tell, Richwood.
4. Silty soils on bottom lands: Arenzville, Orion, Chaseburg.
5. Wet, sandy soils on bottom lands: Alluvial land.

who want a general idea of the soils, who want to compare different parts of a county, or who want to know the location of large areas that would be suitable for a certain kind of farming or other land use.

The five general soil areas, or kinds of soil patterns, in Crawford County are shown on the map in figure 6. The areas are named for the major soil series in them. Soils that are of major extent in one general soil area may be present to a lesser extent or in a somewhat different pattern in other areas. The general soil areas are discussed in the following pages. More detailed information about the soils is given in the section "Descriptions of Soils."

Area 1

Gently sloping to steep, silty soils on uplands: Fayette, Dubuque

This general soil area is made up mainly of Fayette and Dubuque soils, but small acreages of other soils are included. The general area is the largest in the county. It has a ridge-and-valley type of landscape (fig. 7). In the part of the area where ridges predominate, the soils are on rolling ridgetops in uplands that are deeply dissected. Slopes are dominantly 5 to 15 percent.

Fayette and Dubuque soils are the principal soils on the rolling ridgetops; minor soils are the Downs, Gale, and Hixton. The Fayette and Dubuque soils are somewhat similar, but the Fayette are silty to a depth of 42 inches or more and are underlain by sandstone or by dolomitic limestone. The Dubuque soils have formed in silt over red clay. The clay was derived from dolomitic limestone, which is at a depth of less than 40 inches.

The Downs soils are similar to the Fayette soils, but they formed under prairie where there were a few scattered forested areas, rather than mainly under forest. The Downs soils occur only near Mt. Sterling and Fairview.

The Gale and Hixton soils are underlain by St. Peter sandstone. The Gale soils are silty to a depth of 24 to 40 inches. In contrast, the Hixton soils have formed in materials weathered from sandstone.

Steep, stony areas, where there are many escarpments of bedrock, separate this part of the general area from the part where valley slopes predominate. The slopes of the valleys are generally between 30 and 60 percent, but in places there are perpendicular bluffs. In many places there are large outcrops of rock. The soils are very stony and consist only of a thin layer of silty material or of a mixture of silt and sand.

In the part of the general soil area consisting mainly of valley slopes, deep Fayette and Lindstrom soils are on the lower slopes; Hesch, Hixton, Norden, and Gale soils are on the higher, steeper slopes. The lower slopes range from 10 to 20 percent, but the upper slopes are between 15 and 30 percent.

The Fayette and Lindstrom soils are similar, but the Lindstrom soils are darker colored because they formed under prairie rather than forest. The Hesch soils also formed under prairie and have many characteristics similar to those of Hixton soils. The Norden soils are similar to the Hixton and Gale soils, but they formed in materials from a different kind of sandstone. The Norden material is from Franconia sandstone, which is a greenish, glauconitic, fine-grained sandstone that also contains siltstone and shale. The sandstone from which the parent materials of the Gale and Hixton soils were derived is generally coarser textured and more permeable than the Franconia sandstone and varies greatly in color.

Formerly, erosion caused serious damage to the soils in this general area. Using practices to protect the soils has checked the erosion and has prevented more serious damage.

Area 2

Nearly level, sandy soils on terraces: Dakota, Sparta

This general soil area is made up of nearly level, sandy soils on terraces. The principal soils are those of the Dakota and Sparta series. A small acreage of Meridian, Gotham, Bertrand, and Tell soils is also included; the surface layer of these soils ranges from loamy sand to silt in texture. The general area has two main parts. One part is large and is underlain by sandy outwash. It is along the Mississippi River near Prairie du Chien. The other consists of high terraces, or benches, and is along the northern half of the Kickapoo River.

The area of sandy outwash, near Prairie du Chien, lies about 20 feet above the Mississippi River (fig. 8). It consists of a nearly level plain, underlain by acid (granitic) sand and gravel. The coarse-textured, under-

***Figure 7.*—Landscape in general soil area 1 showing Dubuque soils on a narrow ridgetop. The crops have been planted in contour strips.**

***Figure 8.*—Large, nearly level area of Dakota sandy loam on the Prairie du Chien terrace; in the background are steep, stony escarpments.**

lying materials were deposited by the Mississippi River at the time of the Wisconsin glaciation. This part of the general soil area consists mainly of Dakota and Sparta soils that formed under prairie.

The Dakota soils have a surface layer and subsoil of sandy loam to loam; the Sparta soils are more sandy. They are also lower in natural fertility than the Dakota soils and are more likely to be droughty. These soils are susceptible to wind erosion. The hazard of water erosion is not serious.

In the other part of the general soil area are the high, sandy terraces along the Kickapoo River. The terraces are as much as one-half mile wide in places. They are not continuous, because they have been obliterated in many places by the waters of the meandering Kickapoo River. Slopes are predominantly 3 to 4 percent.

The principal soils in this part of the general area are the Meridian and Gotham, but there is a small acreage of Bertrand and Tell soils. The Meridian soils have a surface layer and subsoil of sandy loam or loam and are underlain by medium sand. The Gotham soils have formed partly under prairie and have a darker colored surface layer than the Meridian soils. They are also more sandy, less fertile, and more droughty.

The Bertrand and Tell soils are in lower positions on the terraces than the Meridian and Gotham soils and have a siltier texture. They occupy only a small acreage.

Most of the soils in this general area have a sandy substratum and lie in the way of runoff from higher slopes and ridges. Consequently, they are subject to serious erosion. In places runoff has cut deep gullies far into the terraces.

Area 3

Silty soils on terraces: Tell, Richwood

This general soil area is made up of dominantly silty soils on highly dissected terraces, or benches. The relief is billowy. The principal soils are the Tell and Richwood, but a smaller acreage of Fayette, Seaton, Chelsea, Ettrick, Lindstrom, Meridian, Rowley, and Toddville soils is included.

The terraces occupied by these soils are near Bridgeport and Wauzeka, along the Wisconsin River and adjacent to the Kickapoo River. The Bridgeport terrace lies about 120 to 150 feet above the Wisconsin River and occupies approximately 4,200 acres. The terraces east and west of Wauzeka are similar to the Bridgeport terrace, but they occupy a smaller acreage. Some of the terraces near the Kickapoo River are in the Citron Valley, west of the Citron Valley School. Others are in Haney Valley, south of the Haney Valley School.

The terrace near Bridgeport is occupied mainly by Tell, Fayette, Seaton, and very sandy Chelsea soils. On the terraces east and west of Wauzeka, soils of the Fayette, Chelsea, and Meridian series predominate. The soils have developed in silt and sand and in weathered dolomite. The silt and sand were probably blown onto the areas in glacial times from the flood plains of the Mississippi River. The silty and sandy materials are underlain by acid gravel. The gravel was laid down in an earlier period by the Wisconsin River, which cut deep into the areas. Underlying the gravel is weathered dolomite from the Prairie du Chien formation.

The Tell soils formed in a layer of silt that is 24 to 40 inches thick over outwash sand and gravel. The Fayette and Seaton soils are similar, but the Seaton soils developed in coarser silt than the Fayette. The Chelsea soils developed in thick deposits of sand laid down on the higher parts of the terraces and on the slopes of the headlands above. Bands of sandy loam or loam occur within the Chelsea soils at a depth of 42 inches or more. Deep, silty Lindstrom soils are on the lower valley slopes.

The billowy topography and coarse underlying material cause a serious hazard of erosion. Rapid erosion has cut long, deep gullies from the Wisconsin River far back into the terraces. The gullies generally follow old channels cut into the bedrock by ancient rivers. Since farming began in the area, many new, active gullies have penetrated into the rolling terraces and uplands.

The Citron and Haney Valleys consist of old channels formed by the meandering Kickapoo River. As the river cut deeper and changed its course, these valleys were left at a higher elevation than the new river channel. In these valleys the Richwood, Rowley, and Toddville soils are predominant. These soils have developed under prairie in thick deposits of silt. They are among the best in the county for agriculture. The Richwood soils are well drained; the Rowley soils are somewhat poorly drained; and the Toddville soils are intermediate in drainage between the Richwood and Rowley soils. Other soils of the valley terraces are the Ettrick, which are in depressions, and the deep Lindstrom soils, which are on the lower valley slopes.

Area 4

Silty soils on bottom lands: Arenzville, Orion, Chaseburg

This general soil area is made up of silty soils on bottom lands. The principal soils are the Arenzville, Orion, and Chaseburg, but a smaller acreage of Judson, Meridian, Bertrand, Jackson, and Medary soils is included. The soils are in the major drainageways in the interior of the county. They are subject to flooding.

The Arenzville and Orion soils formed in silt washed from the uplands. Typically, in the profile of these soils there is an old, buried soil at a depth ranging from 1 to 10 feet. The Chaseburg and Judson soils are deep and silty. The Chaseburg soils formed in alluvium washed from upland soils developed under forest, and the Judson, in alluvial materials washed from soils developed under prairie. The Chaseburg and Judson soils are young. They continually receive fresh deposits left by floodwaters during periodic flash floods. The soils are productive, but their use is somewhat limited because of occasional flooding.

The Meridian, Bertrand, and Jackson soils are on small terraces along the larger streams in the lower parts of the valleys. Because of the past cutting action of the older streams, the terraces are generally narrow and irregular in shape. The Meridian soils are sandy, the Bertrand and Jackson soils are deep and silty, and the Medary soils have a clayey subsoil.

Area 5

Wet, sandy soils on bottom lands: Alluvial land

This general soil area consists of wet, sandy soils on the bottom lands of the Mississippi and Wisconsin Rivers. Alluvial land occupies most of the acreage. Its texture varies but consists mainly of silt, coarse sand, and gravel. It has a high, fluctuating water table.

Timber is harvested in some places in this general area, but most of the acreage is best used for recreation or for wildlife.

Descriptions of Soils

Described briefly in this section are the soil series—groups of soils that are much alike—and the mapping units that are shown on the soil map at the back of the report. Terms used in describing the soil series and mapping units are defined in the section "Meanings of Technical Terms." The approximate acreage and proportionate extent of each mapping unit are given in table 2.

In the back of the report, a detailed profile is described for each soil series. A soil profile is a vertical section of a soil showing its various layers (fig. 9). By studying the profiles, soil scientists learn much about the behavior of soils. Following are some of the characteristics observed that are agriculturally important.

Color and content of organic matter.—Some of the soils in Crawford County have a surface layer that is naturally dark colored. In others the color of the surface layer is light. Originally, this difference was caused by the kind of vegetation that grew on the soils when they were forming. Soils formed under prairie grasses generally have a dark-colored surface layer because the grasses have added organic matter to the soil. In contrast, the surface layer of soils formed under trees is light colored because less organic matter is added to the soil by trees. The soils that have a dark, thick surface layer have always been prized by farmers because these soils can be worked into excellent seedbeds.

Originally, the dark-colored soils were more fertile than the light-colored ones, but now, after having been cropped for approximately 100 years, the light-colored and dark-colored soils are nearly equal in fertility. Nevertheless, the soils that have a dark surface layer are still slightly more productive, even after many years of cropping, than the lighter colored soils. This is the result of the binding, or aggregating, effect of the dark organic matter. Both light-colored and dark-colored soils, however, need fresh supplies of organic matter. This can be supplied by turning under crop residues and barnyard manure or green manure.

In this report the color of the soil is described in two ways. First, it is indicated by a descriptive term. Then, in the more detailed soil descriptions in the back of the report, it is also indicated by a Munsell notation, such as (10YR 5/2). The Munsell notation denotes color more precisely than is possible by the use of words. Unless otherwise stated, the color given is that of moist soil.

Depth.—Many of the soils in Crawford County are deep, but others are underlain by sand at a fairly shallow depth. In many of the shallow soils, the surface layer has a texture that is as favorable for crops as that of the surface layer of deeper soils. In dry seasons, however, these shallow soils do not hold adequate moisture for the growth of crops. Most crops have roots that penetrate no deeper than 3 to 5 feet and are damaged in dry years by lack of moisture. Alfalfa and similar crops, however, have roots that penetrate deep enough so that they can use the moisture far down in the solum of deep soils. Consequently, these crops will make good yields in dry years, even though little moisture is available in the upper part of the soil.

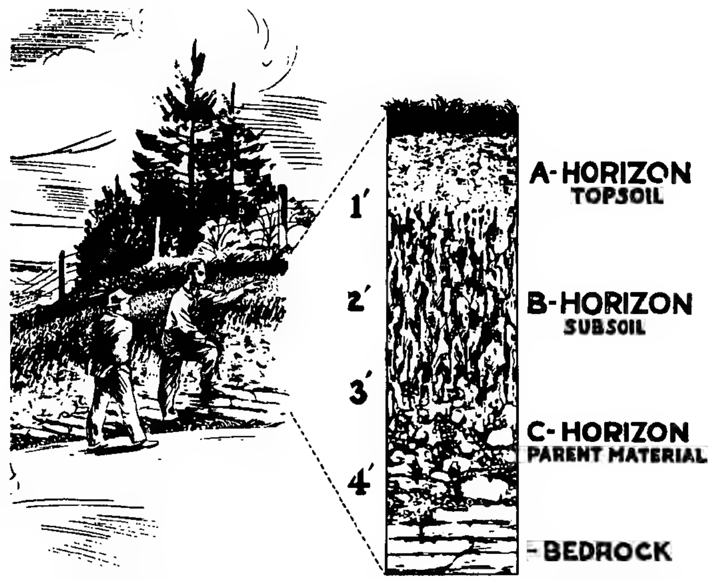

Figure 9.—**Diagram of a soil profile. Courtesy of the Soil Survey Division, Wisconsin Geological and Natural History Survey.**

Texture.—The texture of the soils in this county ranges from sandy to clayey, but silty soils are predominant. The silty soils require only such management practices as careful use of tillage implements, the addition of barnyard manure, and the use of sod crops in the cropping system to keep them in good tilth. Sandy soils, however, need special management because they are likely to be droughty and have limited use for crops. In contrast to the sandy soils, the nearly level, clayey soils generally hold an excess of water. As a result, plants growing on clayey soils are often damaged because they do not get enough air.

Many soils have similar texture in their surface layers, but their lower layers differ greatly. This difference often determines whether a soil is well suited to crops or is poorly suited. The Bertrand and Medary soils, for example, have mellow, silty surface layers. Because their lower layers differ, however, the soils of these two series differ greatly in the crops for which they are suitable.

The lower layers of the Bertrand soils are silty and, therefore, are permeable to water, roots, and air. In the Medary soils, on the other hand, the subsoil is tough, dense, heavy, reddish clay. Water infiltrates very slowly through the clay, and roots have difficulty penetrating it. Consequently, the Medary soils remain wet for several days after a rain; plants grown on these soils often become yellow because of lack of nitrogen.

TABLE 2.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Alluvial land	950	0.3
Alluvial land, poorly drained	32,270	8.6
Arenzville silt loam	3,470	.9
Bertrand silt loam, 2 to 6 percent slopes	350	.1
Bertrand silt loam, 0 to 2 percent slopes	270	.1
Bertrand silt loam, 2 to 6 percent slopes, moderately eroded	120	(1)
Bertrand silt loam, 6 to 12 percent slopes, moderately eroded	540	.1
Boone fine sand, 12 to 30 percent slopes	200	.1
Chaseburg silt loam, 0 to 6 percent slopes	2,020	.5
Chaseburg silt loam, 6 to 12 percent slopes	260	.1
Chelsea fine sand, 12 to 20 percent slopes, eroded	530	.1
Chelsea fine sand, 6 to 12 percent slopes, eroded	70	(1)
Chelsea fine sand, 20 to 30 percent slopes, eroded	90	(1)
Cherty alluvial land	750	.2
Dakota sandy loam, 0 to 3 percent slopes	890	.2
Dakota loam, 0 to 3 percent slopes	530	.1
Downs silt loam, 6 to 12 percent slopes, moderately eroded	340	.1
Downs silt loam, 2 to 6 percent slopes	50	(1)
Downs silt loam, 2 to 6 percent slopes, moderately eroded	160	(1)
Downs silt loam, 12 to 20 percent slopes, moderately eroded	60	(1)
Dubuque silt loam, 20 to 30 percent slopes	19,060	5.1
Dubuque silt loam, 2 to 6 percent slopes, moderately eroded	70	(1)
Dubuque silt loam, 6 to 12 percent slopes, moderately eroded	740	.2
Dubuque silt loam, 12 to 20 percent slopes	7,500	2.0
Dubuque silt loam, 12 to 20 percent slopes, moderately eroded	6,270	1.7
Dubuque silt loam, 20 to 30 percent slopes, moderately eroded	5,050	1.3
Dubuque silt loam, 30 to 45 percent slopes	2,790	.7
Dubuque soils, 12 to 20 percent slopes, severely eroded	1,860	.5
Dubuque soils, 6 to 12 percent slopes, severely eroded	340	.1
Dubuque soils, deep, 12 to 20 percent slopes, severely eroded	5,540	1.5
Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded	45,770	12.2
Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded	230	.1
Dubuque silt loam, deep, 6 to 12 percent slopes	100	(1)
Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded	4,800	1.3
Dubuque silt loam, deep, 12 to 20 percent slopes	11,420	3.0
Dubuque silt loam, deep, 20 to 30 percent slopes	13,480	3.6
Dubuque silt loam, deep, 20 to 30 percent slopes, moderately eroded	6,430	1.7
Dubuque cherty silt loam, 12 to 20 percent slopes	1,560	.4
Dubuque cherty silt loam, 6 to 12 percent slopes	60	(1)
Dubuque cherty silt loam, 12 to 20 percent slopes, moderately eroded	670	.2
Dubuque cherty silt loam, 20 to 30 percent slopes	1,180	.3
Dubuque cherty silt loam, 20 to 30 percent slopes, moderately eroded	130	(1)
Ettrick silt loam	450	.1
Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded	31,310	8.3
Fayette silt loam, uplands, 2 to 6 percent slopes	200	.1
Fayette silt loam, uplands, 2 to 6 percent slopes, moderately eroded	1,720	.5
Fayette silt loam, uplands, 6 to 12 percent slopes	370	.1
Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded	21,460	5.7
Fayette silt loam, uplands, 6 to 12 percent slopes, severely eroded	690	.2
Fayette silt loam, uplands, 12 to 20 percent slopes	3,140	0.8
Fayette silt loam, uplands, 12 to 20 percent slopes, severely eroded	3,920	1.0
Fayette silt loam, uplands, 20 to 30 percent slopes	200	.1
Fayette silt loam, uplands, 20 to 30 percent slopes, moderately eroded	2,160	.6
Fayette silt loam, uplands, 20 to 30 percent slopes, severely eroded	350	.1
Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded	5,400	1.4
Fayette silt loam, valleys, 2 to 6 percent slopes	90	(1)
Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded	150	(1)
Fayette silt loam, valleys, 12 to 20 percent slopes	1,230	.3
Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded	1,180	.3
Fayette silt loam, valleys, 20 to 30 percent slopes	2,530	.7
Fayette silt loam, valleys, 30 to 45 percent slopes	200	.1
Gale silt loam, 12 to 20 percent slopes, moderately eroded	210	.1
Gale silt loam, 2 to 6 percent slopes, moderately eroded	30	(1)
Gale silt loam, 6 to 12 percent slopes, moderately eroded	80	(1)
Gale silt loam, 12 to 20 percent slopes	70	(1)
Gale silt loam, 20 to 30 percent slopes	190	.1
Gale silt loam, 20 to 30 percent slopes, moderately eroded	80	(1)
Gotham loamy fine sand, 6 to 12 percent slopes, eroded	310	.1
Gotham loamy fine sand, 2 to 6 percent slopes	150	(1)
Gotham loamy fine sand, 2 to 6 percent slopes, eroded	160	(1)
Gotham loamy fine sand, 6 to 12 percent slopes	260	.1
Gullied land	140	(1)
Hesch sandy loam, 12 to 20 percent slopes, moderately eroded	100	(1)
Hesch loam, 20 to 30 percent slopes, moderately eroded	70	(1)
Hesch loam, 12 to 20 percent slopes	60	(1)
Hixton sandy loam, 12 to 20 percent slopes, moderately eroded	700	.2
Hixton sandy loam, 2 to 6 percent slopes	50	(1)
Hixton sandy loam, 6 to 12 percent slopes, moderately eroded	170	(1)
Hixton sandy loam, 12 to 20 percent slopes	80	(1)
Hixton sandy loam, 20 to 30 percent slopes	210	.1
Hixton sandy loam, 20 to 30 percent slopes, moderately eroded	80	(1)
Hixton sandy loam, 30 to 45 percent slopes	280	.1
Hixton loam, 20 to 30 percent slopes	250	.1
Hixton loam, 6 to 12 percent slopes, moderately eroded	40	(1)
Hixton loam, 12 to 20 percent slopes	40	(1)
Hixton loam, 12 to 20 percent slopes, moderately eroded	80	(1)
Hixton loam, 20 to 30 percent slopes, moderately eroded	90	(1)
Hixton stony loam, 20 to 30 percent slopes	250	.1
Hixton stony loam, 12 to 20 percent slopes	60	(1)
Jackson silt loam, 0 to 2 percent slopes	200	.1
Jackson silt loam, 2 to 6 percent slopes	140	(1)
Jackson silt loam, 2 to 6 percent slopes, moderately eroded	50	(1)
Judson cherty silt loam, 6 to 12 percent slopes	620	.2
Judson cherty silt loam, 2 to 6 percent slopes	450	.1
Judson silt loam, 0 to 6 percent slopes	1,000	.3
Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded	160	(1)
Lindstrom silt loam, 2 to 6 percent slopes	30	(1)
Lindstrom silt loam, 6 to 12 percent slopes	40	(1)

See footnotes at end of table.

TABLE 2.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded	120	(1)	Rowley silt loam, 0 to 2 percent slopes	420	0.1
Lindstrom silt loam, 12 to 20 percent slopes	70	(1)	Rowley silt loam, 2 to 6 percent slopes	100	(1)
Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded	160	(1)	Seaton silt loam, 12 to 20 percent slopes, moderately eroded	390	.1
Medary silt loam, 0 to 2 percent slopes	380	.1	Seaton silt loam, 2 to 6 percent slopes, moderately eroded	140	(1)
Medary silt loam, 2 to 6 percent slopes	210	.1	Seaton silt loam, 6 to 12 percent slopes, moderately eroded	170	(1)
Medary silt loam, 6 to 12 percent slopes, moderately eroded	100	(1)	Sparta loamy fine sand, 0 to 2 percent slopes	650	.2
Meridian sandy loam, 2 to 6 percent slopes	300	.1	Sparta loamy fine sand, 2 to 6 percent slopes	580	.2
Meridian sandy loam, 0 to 2 percent slopes	250	.1	Sparta loamy fine sand, 2 to 6 percent slopes, eroded	640	.2
Meridian sandy loam, 2 to 6 percent slopes, moderately eroded	140	(1)	Sparta loamy fine sand, 6 to 12 percent slopes	50	(1)
Meridian sandy loam, 6 to 12 percent slopes, moderately eroded	170	(1)	Sparta loamy fine sand, 6 to 12 percent slopes, eroded	40	(1)
Meridian loam, 6 to 12 percent slopes, moderately eroded	70	(1)	Steep stony and rocky land	95, 160	25.4
Meridian loam, 0 to 2 percent slopes	50	(1)	Stony colluvial land	700	.2
Meridian loam, 2 to 6 percent slopes	30	(1)	Tell silt loam, 2 to 6 percent slopes, moderately eroded	270	.1
Norden fine sandy loam, 20 to 30 percent slopes	550	.1	Tell silt loam, 0 to 2 percent slopes	140	(1)
Norden fine sandy loam, 12 to 20 percent slopes	40	(1)	Tell silt loam, 6 to 12 percent slopes, moderately eroded	200	.1
Norden fine sandy loam and loam, 12 to 20 percent slopes, moderately eroded	310	.1	Tell silt loam, 12 to 20 percent slopes, moderately eroded	100	(1)
Norden fine sandy loam and loam, 20 to 30 percent slopes, moderately eroded	500	.1	Terrace escarpments, sandy	250	.1
Norden fine sandy loam and loam, 30 to 45 percent slopes	170	(1)	Terrace escarpments, loamy	1, 170	.3
Orion silt loam	4, 720	1.3	Toddville silt loam, 0 to 2 percent slopes	120	(1)
Orion silt loam, poorly drained variant	1, 560	.4	Toddville silt loam, 2 to 6 percent slopes	120	(1)
Richwood silt loam, 0 to 2 percent slopes	500	.1	Waukegan loam	280	.1
Richwood silt loam, 2 to 6 percent slopes	200	.1	Total	375, 040	[2] 99.2
Richwood silt loam, 6 to 12 percent slopes	50	(1)			

[1] Less than 0.1 percent.
[2] Soils that have an acreage of less than 0.1 percent make up the remaining 0.8 percent of the total land area.

Soils that have a clayey surface layer should not be tilled when wet, because clods will form when the soil dries. A cloddy soil is difficult to work into a good seedbed. Clayey soils also puddle after a rain; as a result, much of the surface soil washes away with the runoff water.

Consistence.—The consistence of a soil is closely related to its texture. By consistence is meant the feel of the soil material when it is rubbed between the fingers. Terms used to describe consistence are *friable*, used to describe consistence when the soil is moist; *plastic*, used to describe consistence when the soil is wet; and *hard*, used to describe consistence when the soil is dry. Most soils that have a silty texture and granular structure also are friable. A friable soil is more desirable for agriculture than one that is firm, very firm, or loose. It can be worked easily and generally will make a good seedbed. (For a more complete definition of consistence, see the section "Meanings of Technical Terms" at the back of the report.)

Structure.—Structure is an important characteristic of a soil. The structure is the way individual particles of soil are arranged, or grouped, in larger aggregates. These soil aggregates may be granular, blocky, or platelike, or they may have other forms. The size of the aggregates, their shape, and the pore space between them determine how well water and air move through the solum and how easily roots can penetrate. In sandy soils, for example, the pores are large and water and air move readily through the profile. Clayey soils, on the other hand, have small pores, and, therefore, they store water. In soils that have a granular structure, the granules fit together loosely like bread crumbs; the pores are many and are both small and large. Consequently, granular structure is generally desirable.

In soils that have a blocky structure, the aggregates are laid together much like stacked bricks. Some of the blocks are square, others are rectangular, and still others are irregular in shape. The blocks range from $^{1}/_{10}$ inch to 3 inches in diameter. Soils that have a blocky structure are high in clay; water infiltrates through them slowly, and roots have difficulty in penetrating. These soils are likely to remain wet and cold until late in spring. If the soils are tilled when wet, clods form when the soils dry out, and it is difficult to prepare a good seedbed. Clayey soils also puddle after a rain. As a result, much soil is washed away with the water that runs off.

Erosion.—Degree of erosion and susceptibility to erosion are characteristics that greatly affect the use of a soil. The amount of erosion is indicated in the names of many of the mapping units. As a rule, soils that have lost from one-third to two-thirds of the original surface layer through erosion are mapped as *moderately eroded.* Soils that have lost as much as two-thirds of their original surface layer through erosion are mapped as *severely eroded.* Eroded soils are, of course, less desirable for crops than uneroded soils. They will also need to be protected from further erosion.

Alluvial Land

Alluvial land is a miscellaneous land type[2] made up of materials deposited by streams. The deposits are too recent for a soil profile to have formed, but they are mottled in places. The soil materials vary widely in texture, and in most places they are stratified. Generally, they have been in place long enough for trees and other plants to grow, but the areas are flooded frequently and are subject to change.

Alluvial land (Ab).—This miscellaneous land type is made up of sand and silt mixed with chert and stones that were deposited when streams overflowed. Because the soil materials vary widely and there is a serious risk of flooding, growing crops on the areas is hazardous. Some areas, however, are used for crops. (Capability unit IIIw–14.)

Alluvial land, poorly drained (Aa).—Most of this mapping unit is on the bottom lands of the Mississippi and Wisconsin Rivers. Only small, scattered areas occur along the inland streams. The land type consists of a mixture of sands and silts that vary in characteristics. The areas are flooded frequently.

Alluvial land, poorly drained, is not suited to crops. Most areas are wooded and are used for recreation or for wildlife. (Capability unit Vw–15.)

Arenzville Series

The Arenzville series is made up of deep, silty, alluvial soils that are well drained to moderately well drained. The soils occur on many of the bottom lands of the county. They have formed in silty materials. These materials were washed into streams flowing from the uplands and were then redeposited on the bottom lands by stream overflow. The materials are stratified, and the separate layers can be clearly seen in the profile. In most places there is a darker, buried soil at a depth between 1½ and several feet.

The Arenzville soils are closely associated with the Orion soils, but the Orion soils are less well drained. Only one soil of this series—Arenzville silt loam—is mapped in this county.

Arenzville silt loam (Ar).—This soil has slopes of 0 to 3 percent. The upper part of the profile consists of very dark grayish-brown to very dark gray, stratified silt loam that is 18 to 42 inches thick. In a few places there are thin layers of very fine sand. Just below is the surface layer of an old, buried soil. The uppermost layer in the buried soil consists of black silt loam. It is underlain by a subsoil of dark grayish-brown silty clay loam that is several feet thick.

This soil is flooded occasionally. Nevertheless, if it is well managed, good yields can be obtained. In some places dikes or diversion terraces will be needed to control damaging floodwaters. In places, where this soil is in narrow drainageways, its use for crops is restricted. (Capability unit IIw–11.)

[2] Miscellaneous land types are areas that have little true soil, that are too inaccessible to be surveyed, or that for other reasons cannot feasibly be classified and mapped in detail. They are not classified in types, series, or phases but are identified by descriptive names.

Bertrand Series

The Bertrand series is made up of deep, well-drained, silty soils that are on the terraces of the larger streams in the county. The soils have developed under forest from silt laid down by wind and water. They are closely associated with the Jackson soils, but they are better drained.

Bertrand silt loam, 2 to 6 percent slopes (BeB).—This is one of the most extensive of the Bertrand soils in the county. The surface layer is dark grayish-brown silt loam that is 6 to 9 inches thick. The subsoil is dark yellowish-brown silty clay loam and extends to a depth of about 38 inches. The substratum is yellowish-brown silt loam.

If erosion is controlled and this soil is well managed otherwise, it can be used fairly intensively for crops. Yields are high. (Capability unit IIe–1.)

Bertrand silt loam, 0 to 2 percent slopes (BeA).—This soil is similar to Bertrand silt loam, 2 to 6 percent slopes, but it has milder slopes and a slightly thicker surface layer. Also, the hazard of erosion is less and the soil is only slightly eroded. (Capability unit I–1.)

Bertrand silt loam, 2 to 6 percent slopes, moderately eroded (BeB2).—Because of erosion, the surface layer of this soil is lighter colored than that of Bertrand silt loam, 2 to 6 percent slopes, and it is only 5 to 6 inches thick. If the soil is plowed, the yellowish-brown subsoil is exposed in small areas. (Capability unit IIe–1.)

Bertrand silt loam, 6 to 12 percent slopes, moderately eroded (BeC2).—As a result of erosion, the surface layer of this soil is lighter colored than that of Bertrand silt loam, 2 to 6 percent slopes, and it is only 4 to 5 inches thick. The subsoil is also thinner. The soil is more easily eroded and is somewhat more difficult to manage than Bertrand silt loam, 2 to 6 percent slopes. Included with this soil are areas of slightly eroded soils that were too small to map separately. (Capability unit IIIe–1.)

Boone Series

The Boone series is made up of very sandy, shallow soils that are excessively drained. The soils are below escarpments in small areas that are scattered throughout the county. They have developed in place from sandstone bedrock. The slopes are moderately steep to steep. Only one soil of this series—Boone fine sand, 12 to 30 percent slopes—is mapped in this county.

Boone fine sand, 12 to 30 percent slopes (BoD).—Pieces of sandstone of various sizes and shapes are on the surface of this soil. In a moderately eroded area in a pastured woodlot, the surface layer is dark grayish-brown fine sand and is about 4 inches thick. Below this is yellowish-brown, light brownish-gray, and light yellowish-brown fine sand in successive layers. Bedrock, consisting of layers of white and pale-yellow, soft, fine-grained sandstone, is at a depth of about 25 inches. Figure 10 shows a profile of Boone fine sand.

This soil is not well suited to crops. Although in some places it is only slightly eroded and in others it is moderately eroded, all of it can be used and managed about the same. (Capability unit VIIs–3.)

Figure 10.—**Profile of a Boone fine sand. This soil developed in sandstone of the Trempealeau formation.**

Chaseburg Series

The Chaseburg soils are well drained to moderately well drained. They occur in small areas throughout the county along small, intermittent streams and in fans that lead from draws and drainageways. The soils have developed under forest in local, silty materials that were washed from the uplands. In places small fragments of stone and thin lenses of sand occur throughout the profile. The slopes range from 0 to 12 percent.

Most areas of these soils are flooded occasionally. The floodwaters leave fresh deposits of silt from the uplands.

Chaseburg silt loam, 0 to 6 percent slopes (CaB).—This is the most extensive of the Chaseburg soils. Most of it is used for crops.

The upper part of the profile is very dark grayish-brown to brown silt loam to a depth of 24 to 36 inches. It contains many thin, stratified layers of silt, which are the result of deposition by flooding. In some places, at a depth below 36 inches, the profile is slightly lighter colored and stratification is less pronounced.

This soil is highly productive if it is well managed. In some places, however, it is subject to severe erosion if it is cultivated and is not protected from flooding. (Capability unit IIw-11.)

Chaseburg silt loam, 6 to 12 percent slopes (CaC).—This soil generally has more fragments of stone on the surface and throughout the profile than Chaseburg silt loam, 0 to 6 percent slopes. Because of the stronger slopes, runoff is also more rapid. As a result, there is a greater hazard of erosion. (Capability unit IIIe-11.)

Chelsea Series

The Chelsea series consists of deep, sandy soils that are excessively drained. The soils developed on valley slopes on high terraces or high dunes. They are mainly near Prairie du Chien, Bridgeport, and Wauzeka, and in areas scattered throughout the Kickapoo Valley. Slopes range from 6 to 30 percent but are dominantly between 12 and 20 percent. In many places bands of sandy loam and loam are at a depth below 42 inches.

Chelsea fine sand, 12 to 20 percent slopes, eroded (ChD2).—The surface layer of this soil is dark grayish-brown fine sand and is 7 to 9 inches thick. It is underlain by dark-brown fine sand that extends to a depth of about 16 inches. Below this is the dark yellowish-brown or yellowish-brown substratum, which is many feet thick. In many places there are horizontal bands at a depth of 42 inches or more. The bands consist of reddish-brown sandy loam or loam and are 1 to 10 inches thick.

This soil is droughty and is very susceptible to further erosion. The areas show much evidence of erosion. (Capability unit VIIs-3.)

Chelsea fine sand, 6 to 12 percent slopes, eroded (ChC2).—This soil has a slightly thicker surface layer and subsoil than Chelsea fine sand, 12 to 20 percent slopes, eroded. It is also less subject to erosion by water. (Capability unit VIIs-3.)

Chelsea fine sand, 20 to 30 percent slopes, eroded (ChE2).—The surface layer of this soil is only 5 to 8 inches thick. It contains less fine material than that of Chelsea fine sand, 12 to 20 percent slopes, eroded, and the subsoil is thinner. (Capability unit VIIs-3.)

Cherty Alluvial Land

Cherty alluvial land (Ct).—This miscellaneous land type is made up of deposits of sandy and cherty materials that have been laid down on bottom lands by the waters of rapidly flowing, turbulent streams (fig. 11). The areas are near the channels of the streams and are generally small. Slopes are less than 5 percent.

The large amount of sand and chert in Cherty alluvial land and the risk of flash floods make the land unsuitable for cultivated crops. Most areas are used for pasture, but the amount of forage is limited. (Capability unit VIs-3.)

Dakota Series

The Dakota soils are well drained. In this county they occur mainly on the large outwash terrace near Prairie

Figure 11.—**Fresh deposits of stony material have been deposited on this area of Cherty alluvial land by runoff.**

du Chien. The soils are moderately deep. They have developed in sandy loam or loam that is 24 to 36 inches deep over loose sand and gravel. The Dakota soils are closely associated with the Sparta and Waukegan soils. They are finer textured than the Sparta soils and are coarser textured than the Waukegan.

Dakota sandy loam, 0 to 3 percent slopes (DkA).—The surface layer of this soil is black to very dark brown sandy loam and is 10 to 12 inches thick. The subsoil is dark-brown sandy loam or loam. It overlies a sandy substratum that contains some gravel. Depth to the substratum ranges from 24 to 36 inches, but in some places the substratum is at a depth of less than 24 inches.

This soil is more likely to be eroded by wind than by water, but the hazard of erosion is slight. Crops are likely to be damaged in years of drought, but yields usually are moderate. (Capability unit IIIs–2.)

Dakota loam, 0 to 3 percent slopes (DaA).—This soil is similar to Dakota sandy loam, 0 to 3 percent slopes, but it has a finer textured surface layer and subsoil. The surface layer is very dark brown to black loam and is 8 to 14 inches thick. The subsoil, a dark-brown loam or sandy clay loam, overlies a yellowish-brown, sandy substratum that contains some gravel. Depth to the substratum ranges from 24 to 36 inches.

This soil occupies large, flat areas. Consequently, it is more susceptible to erosion by wind than by water, although the hazard of erosion is slight. Yields are moderate, but in dry years they are likely to be lower than normal. (Capability unit IIs–1a.)

Downs Series

The Downs soils are deep and silty and are well drained. They are on ridges, mainly near Mt. Sterling and Fairview. The slopes are gentle to moderately steep. The soils have developed in a thick blanket of windblown silt, or loess, under scattered patches of forest within a prairie area (fig. 12). They are similar to the Fayette soils, but they have a thicker, darker surface soil and their subsoil is a darker brown.

These soils have a high moisture-supplying capacity. Their natural fertility is fairly high.

Downs silt loam, 6 to 12 percent slopes, moderately eroded (DoC2).—This is the most extensive of the Downs soils. In areas that have been cultivated, plowing has exposed small patches of a lighter colored soil material or brownish subsoil.

The surface layer is very dark grayish-brown, friable silt loam and is 5 to 7 inches thick. The subsoil is dark-brown silty clay loam. It overlies dark yellowish-brown silt that is at a depth between 36 and 42 inches. Depth to sandstone or limestone bedrock is 4 feet or more. (Capability unit IIIe–1.)

Downs silt loam, 2 to 6 percent slopes (DoB).—The surface layer of this soil is 8 to 12 inches thick. It has a higher content of organic matter and is more permeable than that of Downs silt loam, 6 to 12 percent slopes, moderately eroded. (Capability unit IIe–1.)

Downs silt loam, 2 to 6 percent slopes, moderately eroded (DoB2).—The surface layer of this soil contains less organic matter and is slightly lighter in color than that of Downs silt loam, 2 to 6 percent slopes. It is 6 to 8 inches thick. (Capability unit IIe–1.)

Figure 12.—**Profile of a Downs silt loam.**

Downs silt loam, 12 to 20 percent slopes, moderately eroded (DoD2).—This soil has a thinner, lighter colored surface layer than Downs silt loam, 6 to 12 percent slopes, moderately eroded. In many places patches of brownish subsoil are exposed. (Capability unit IVe–1.)

Dubuque Series

The soils of the Dubuque series are well drained. They are on ridges (fig. 13) and are underlain by dolomitic limestone of the Prairie du Chien and Platteville formations. The soils developed in a mantle of windblown silt from 10 to 40 inches thick. The underlying reddish clay was derived from the limestone and contains fragments of chert. In the soils not named as deep, the depth

Figure 13.—**Many of the Dubuque soils are on ridges that are suitable for contour stripcropping.**

of soil over rock varies; bedrock is generally at a depth between 20 and 36 inches and generally is less than 30 inches deep. For all of these soils, the hazard of erosion is moderate to severe.

The Dubuque soils not named as deep are normally on the steeper slopes of the narrower ridges, below areas of Fayette soils and of deep Dubuque soils. Fragments of chert lie on the surface in many places and occur throughout the profile. In some places on the ridges, the Platteville limestone is thin or has disintegrated and the red clay rests on Glenwood shale. In areas where the fragments of chert are especially numerous and pieces of limestone lie on the surface, the soils have been mapped as cherty Dubuque soils. The cherty Dubuque soils are somewhat droughty, but all of the shallower Dubuque soils are likely to be droughty in dry years.

The deep soils of the Dubuque series developed in silty material that is 20 to 40 inches thick. This silty material overlies reddish, clayey residuum from limestone. These deep soils have good moisture-holding capacity.

Dubuque silt loam, 20 to 30 percent slopes (DuE).—This is the most extensive of the Dubuque silt loams. It has been kept in pasture or trees, and, therefore, is little eroded.

The surface soil is dark grayish-brown silt loam and is 5 to 7 inches thick. Below this is a layer of brown to dark-brown silty clay loam, 8 to 10 inches thick, that developed in windblown silt. The lower part of the subsoil developed in reddish-brown clay. Depth to limestone bedrock is generally less than 30 inches (Capability unit VIe–1.)

Dubuque silt loam, 2 to 6 percent slopes, moderately eroded (DuB2).—The surface layer of this soil is about 5 to 7 inches thick. In cultivated areas plowing has exposed small patches of subsoil, which is lighter colored than the original surface layer. Depth to bedrock is generally more than 30 inches. Included with this soil are a few areas of less eroded soils that were too small to map separately. (Capability unit IIe–2.)

Dubuque silt loam, 6 to 12 percent slopes, moderately eroded (DuC2).—The surface layer of this soil is 4 to 6 inches thick. In many places large patches of subsoil have been exposed through erosion. These patches are lighter colored than the original surface layer. (Capability unit IIIe–2.)

Dubuque silt loam, 12 to 20 percent slopes (DuD).—This soil is similar to Dubuque silt loam, 20 to 30 percent slopes, but it has milder slopes and a darker colored surface layer. In addition, the surface layer contains more organic matter and has more favorable structure. (Capability unit IVe–2.)

Dubuque silt loam, 12 to 20 percent slopes, moderately eroded (DuD2).—Much of the original surface layer of this soil has been removed through erosion. Plowing has mixed much of the brownish subsoil with the remaining surface soil. As a result, the present surface layer is somewhat lighter colored and heavier textured than that of the less sloping, eroded Dubuque soils. The present surface layer is 4 to 5 inches thick. (Capability unit IVe–2.)

Dubuque silt loam, 20 to 30 percent slopes, moderately eroded (DuE2).—Most of the original surface layer of this soil has been lost through erosion. In many places the subsoil is exposed or has been mixed with the remaining surface soil by plowing. As a result, the present surface layer is light colored and contains only a small amount of organic matter. Its structure is poorer and water infiltrates at a slower rate than in the original surface layer. Included with this soil are a few severely eroded areas that were too small to map separately. (Capability unit VIe–1.)

Dubuque silt loam, 30 to 45 percent slopes (DuF).—This soil has steeper slopes and is shallower than Dubuque silt loam, 20 to 30 percent slopes. Depth to bedrock is less than 24 inches. Also, rock outcrops and scattered fragments of chert and stones are more common. (Capability unit VIIe–1.)

Dubuque soils, 12 to 20 percent slopes, severely eroded (DwD3).—In this mapping unit nearly all of the original surface layer has been lost through erosion. Much subsoil has been mixed with the remaining surface layer by plowing. As a result of this mixing, the texture of the present surface layer varies markedly from place to place within short distances. Because areas of each texture were so small, the soils have been mapped as Dubuque soils.

The present surface layer consists of dark-brown to reddish-brown silty clay loam. It is underlain by a reddish-brown, clayey substratum. Depth to bedrock is generally less than 2 feet. Fragments of chert are scattered over the surface in varying amounts.

Shallowness to bedrock makes these soils droughty, and there is a serious hazard of further erosion. Consequently, the soils are hard to manage and to cultivate. (Capability unit VIe–1.)

Dubuque soils, 6 to 12 percent slopes, severely eroded (DwC3).—These soils are less sloping than Dubuque soils, 12 to 20 percent slopes, severely eroded, and are slightly thicker over bedrock. Also, they are slightly easier to manage. (Capability unit IVe–2.)

Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded (DvD2).—This is the most extensive of the deep Dubuque silt loams in the county. In areas that have been cultivated, patches of brownish subsoil are exposed.

The surface layer is dark grayish-brown silt loam and is less than 6 inches thick (fig. 14). The subsoil is about 3 feet thick. The upper part of the subsoil is brownish silty clay loam developed in loess; the lower part contains varying amounts of chert and consists of reddish clay developed in residual material from limestone. Depth to limestone bedrock ranges from 3 to 5 feet.

This soil has good moisture-holding capacity. It responds well to good management. (Capability unit IVe–1.)

Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded (DvB2).—This soil is similar to Dubuque silt loam, 12 to 20 percent slopes, moderately eroded, but the surface layer is about 7 to 8 inches thick and depth to bedrock is generally greater. In many places the subsoil, of a lighter color than the surface layer, has been exposed as the result of erosion. Included with this soil are areas of less eroded soils. These areas were too small to map separately. (Capability unit IIe–1.)

Dubuque silt loam, deep, 6 to 12 percent slopes

Figure 14.—**Profile of a deep Dubuque silt loam. The upper part developed in silt that was laid down by wind; the lower part developed in residual material from limestone. The light-colored underlying material is Glenwood shale.**

(DvC).—This soil is only slightly eroded. The surface layer has a higher content of organic matter than that of Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded, and the soil material is more friable. As a result, water soaks in more readily, and the soil is less likely to erode. This soil makes a good seedbed. (Capability unit IIIe-1.)

Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded (DvC2).—The surface layer of this soil is thinner and lighter colored than that of Dubuque silt loam, deep, 6 to 12 percent slopes, and it contains less organic matter. It also absorbs less water and is more likely to erode. (Capability unit IIIe-1.)

Dubuque silt loam, deep, 12 to 20 percent slopes (DvD).—This soil is only slightly eroded. Its surface layer is thicker than that of Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded, and is more friable. The surface layer also has a higher content of organic matter and makes a better seedbed. (Capability unit IVe-1.)

Dubuque silt loam, deep, 20 to 30 percent slopes (DvE).—This soil has been kept in pasture or trees, and, therefore, it is little eroded. The horizons in the soil profile are somewhat thinner than those in Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded. Depth to bedrock is about 3 feet. (Capability unit VIe-1.)

Dubuque silt loam, deep, 20 to 30 percent slopes, moderately eroded (DvE2).—In this soil most of the original surface layer has been lost through erosion. The present surface layer consists mostly of brownish subsoil. The hazard of erosion is severe, and in places gullying is serious. Depth to bedrock is slightly less than in Dubuque silt loam, deep, 20 to 30 percent slopes. (Capability unit VIe-1.)

Dubuque soils, deep, 12 to 20 percent slopes, severely eroded (DxD3).—In these soils the present surface layer consists mostly of brownish subsoil. As a result, the present surface layer has a slightly heavier texture than that of the less eroded, deep Dubuque silt loams. Also, it contains less organic matter, is less friable, and less water infiltrates into it. These soils are very susceptible to further erosion. (Capability unit VIe-1.)

Dubuque cherty silt loam, 12 to 20 percent slopes (DtD).—This is the most extensive of the Dubuque cherty silt loams in the county. Typically, the surface layer is grayish-brown silt loam and contains stones and fragments of chert. The subsoil is brownish silty clay loam and is also cherty. Reddish-brown clay makes up the substratum. Depth to bedrock is generally less than 2 feet.

Because of the chert and stones in the profile and its position on narrow ridges, this soil is seldom cultivated. (Capability unit VIe-1.)

Dubuque cherty silt loam, 6 to 12 percent slopes (DtC).—This soil is mainly on the ends of narrow ridgetops. In places limestone bedrock is exposed. (Capability unit IVe-5.)

Dubuque cherty silt loam, 12 to 20 percent slopes, moderately eroded (DtD2).—Erosion has caused this soil to lose much of its original surface layer, and patches of brownish subsoil are exposed. Generally, the surface layer contains a greater number of stones and fragments of chert than that of Dubuque cherty silt loam, 12 to 20 percent slopes. (Capability unit VIe-1.)

Dubuque cherty silt loam, 20 to 30 percent slopes (DtE).—This soil is only slightly eroded, and most of its original surface layer remains intact. Depth to bedrock is generally less than 18 inches. (Capability unit VIIe-1.)

Dubuque cherty silt loam, 20 to 30 percent slopes, moderately eroded (DtE2).—This soil is similar to Dubuque cherty silt loam, 12 to 20 percent slopes, but patches of brownish subsoil have been exposed through erosion. Also, this soil is shallower over bedrock. (Capability unit VIIe-1.)

Ettrick Series

The Ettrick soils are deep and silty and are poorly drained. They are on stream bottoms where the water table is generally high. Slopes range from 0 to 3 percent. These soils developed in silty materials that were washed from surrounding uplands and terraces. The silty materials were carried by streams and were then redeposited on the higher flood plains by floodwaters. The soils formed under water-tolerant grasses and sedges. They have a thick, black surface layer. Only one soil of this series—Ettrick silt loam—is mapped in this county.

Ettrick silt loam (Et).—The profile of this soil was observed in a pastured field in Citron Valley. The surface layer is black silt loam that is 7 inches thick. Underlying this and extending to a depth of 15 inches is a layer of very dark gray, light silty clay loam that has brownish mottles. The subsoil is grayish-brown silty clay loam mottled with olive brown. It is underlain by a layer of light brownish-gray silt loam, several feet thick, that is strongly mottled with olive brown and yellowish brown.

If this soil is adequately drained and otherwise well managed, high yields can be obtained. (Capability unit IIw-1a.)

Fayette Series

The Fayette soils are deep and well drained. Some of the areas are on ridges, and others are on the concave slopes of valleys. The areas on valley slopes lie mainly below areas of soils weathered from bedrock. A few small, scattered areas on valley slopes, however, lie below escarpments of Steep stony and rocky land, and sandy material from the escarpments has washed onto them. The Fayette soils have developed in thick deposits of windblown silt, or loess. This silty material overlies limestone or sandstone bedrock, which is at a depth of 42 inches or more. Slopes are dominantly between 6 and 20 percent, but they range from 2 to 45 percent.

The Fayette soils are closely associated with the Dubuque soils, but they have developed in a thicker deposit of silt than the Dubuque soils.

In areas that have not been limed, the Fayette soils are acid to a depth of 5 feet or more. The soils are productive if well managed, but they are susceptible to erosion. In areas on the steeper slopes, the hazard of erosion is severe.

The Fayette soils on valley slopes have a somewhat lighter textured, but less well developed, subsoil than the Fayette soils on upland ridges. They also have small pieces of sandstone or limestone throughout the profile. Consequently, two topographic phases of Fayette silt loam—uplands and valleys—have been mapped in this county. Figure 15 shows a profile of Fayette silt loam, valleys.

Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded (FaD2).—This is the most extensive of the Fayette soils in the county. It has lost most of the original surface layer as the result of erosion. In many places the brownish subsoil is exposed.

The surface layer is dark grayish-brown, very friable silt loam and is 5 to 7 inches thick. The subsoil is brownish, heavy silt loam or silty clay loam that extends from a depth of 8 to about 50 inches. Below this is unweathered silt loam that in places is several feet thick over bedrock or over clay weathered from bedrock. In areas where the deposits of silt are more than 6 to 8 feet deep, the substratum is slightly limy in places. (Capability unit IVe-1.)

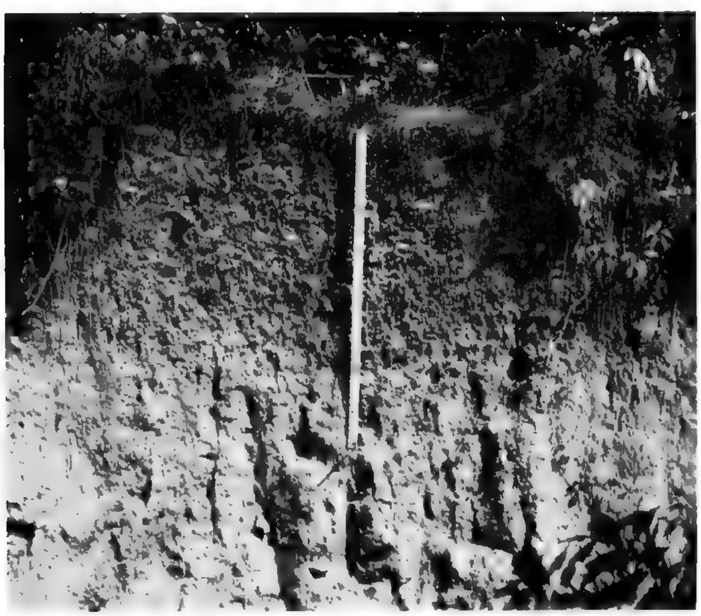

***Figure 15.*—A profile of a Fayette soil formed under forest in deep deposits of windblown silt; the rule is 4 feet long.**

Fayette silt loam, uplands, 2 to 6 percent slopes (FaB).—This soil is near the tops of broad ridges. It is similar to Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded, but it has a thicker, slightly darker surface layer. Consequently, this soil is easier to cultivate and to manage than the more sloping soil. Its mild slopes, depth, and silty texture make this soil among the most desirable of the upland soils in the county for agriculture. (Capability unit IIe-1.)

Fayette silt loam, uplands, 2 to 6 percent slopes, moderately eroded (FaB2).—Because of erosion caused by past intensive farming, this soil has lost as much as two-thirds of its original surface layer. In many places part of the lighter colored subsoil has been mixed with the remaining surface layer by plowing or is exposed. The present surface layer is less than 8 inches thick. (Capability unit IIe-1.)

Fayette silt loam, uplands, 6 to 12 percent slopes (FaC).—This soil is only slightly eroded and has a surface layer that is 10 inches thick. It is similar to Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded, but its surface layer is more friable and contains more organic matter. (Capability unit IIIe-1.)

Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded (FaC2).—Because of erosion, this soil has lost as much as two-thirds of its original surface layer. Consequently, the present surface layer is thinner and lighter colored than that of Fayette silt loam, uplands, 6 to 12 percent slopes. In places the brownish subsoil has been exposed by plowing. (Capability unit IIIe-1.)

Fayette silt loam, uplands, 6 to 12 percent slopes, severely eroded (FaC3).—This soil has lost most of its original surface layer through erosion. Otherwise, it is similar to Fayette silt loam, uplands, 6 to 12 percent slopes. The present surface layer is less friable than the original one and is harder to keep in good tilth. In areas that are cultivated, the surface layer has a brownish color as the result of much subsoil having been mixed with the remaining surface soil. This soil is susceptible to further erosion. (Capability unit IVe-1.)

Fayette silt loam, uplands, 12 to 20 percent slopes (FaD).—This soil is similar to Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded, but it has a thicker surface layer. Most of the soil has been kept in pasture or in trees, and, consequently, it is little eroded. (Capability unit IVe-1.)

Fayette silt loam, uplands, 12 to 20 percent slopes, severely eroded (FaD3).—This soil has lost most of its original surface layer and part of its subsoil through erosion. The present surface layer is brownish and consists mainly of soil material from the subsoil. It is less friable than that of Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded, and has poorer structure. The soil is also less permeable and more susceptible to further erosion. (Capability unit VIe-1.)

Fayette silt loam, uplands, 20 to 30 percent slopes (FaE).—This soil has thinner horizons and a shallower

solum than Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded. In many places depth to the silty substratum is less than 3 feet. (Capability unit VIe–1.)

Fayette silt loam, uplands, 20 to 30 percent slopes, moderately eroded (FaE2).—This soil has lost much of its original surface layer through erosion. As a result, the present surface layer has a lighter color than that of Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded, and it contains less organic matter. Furthermore, more of the subsoil has been exposed by plowing. (Capability unit VIe–1.)

Fayette silt loam, uplands, 20 to 30 percent slopes, severely eroded (FaE3).—This soil has lost most of its original surface layer and part of its subsoil through erosion. The present surface layer has a brownish color and is low in organic matter. It is less friable than the surface layer of Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded. Gullies form rapidly in this soil. Runoff is very rapid, and in many places it damages crops in the fields below. (Capability unit VIIe–1.)

Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded (FvE2).—This soil has lost much of its original surface layer through erosion. The present surface layer is grayish-brown, friable silt loam that is 4 to 8 inches thick. The subsoil is brown to yellowish-brown, light silty clay loam and extends from a depth of 8 to about 40 inches. Below this, the yellowish-brown, silty substratum extends downward for several more feet.

Included with this soil are areas that are severely eroded. These were too small to map separately.

Because of strong slopes and runoff from the soils above, Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded, is susceptible to erosion. (Capability unit VIe–1.)

Fayette silt loam, valleys, 2 to 6 percent slopes (FvB).—Most of this soil is only slightly eroded, but small areas are included in which the soil is moderately eroded. The solum is thicker than that of Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded. The surface layer is generally more than 12 inches thick. It is moderately high in organic matter and is very permeable. In the moderately eroded areas, however, the surface layer is thinner, lighter colored, and less friable.

This soil is desirable for crops, but it needs protection from runoff from the slopes above. (Capability unit IIe–1.)

Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded (FvC2).—Much of the surface layer of this soil has been lost through erosion. In many places the former subsoil is exposed. Mapped with this soil are small areas of slightly eroded and severely eroded soils. In the areas where the soil is only slightly eroded, little of the subsoil has been exposed. In the severely eroded areas, the surface layer consists mostly of soil material from the former subsoil. (Capability unit IIIe–1).

Fayette silt loam, valleys, 12 to 20 percent slopes (FvD).—Except for having a thicker surface layer and a slightly thicker solum, this soil is similar to Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded. The soil has lost less than one-third of the original surface layer through erosion. (Capability unit IVe–1.)

Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded (FvD2).—The surface layer of this soil is less friable and less permeable than that of Fayette silt loam, valleys, 12 to 20 percent slopes. Nearly two-thirds of the original surface layer has been lost through erosion. The present surface layer contains much brownish soil material from the subsoil and is low in organic matter. (Capability unit IVe–1.)

Fayette silt loam, valleys, 20 to 30 percent slopes (FvE).—This soil is only slightly eroded and has a slightly darker and thicker surface layer; otherwise, it is similar to Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded. The soil is too steep to farm. Runoff from the slopes above is likely to cause severe erosion. (Capability unit VIe–1.)

Fayette silt loam, valleys, 30 to 45 percent slopes (FvF).—The profile of this very steep soil is not so well developed as that of the other Fayette soils. In most of the areas, the surface layer is less than 8 inches thick and the subsoil extends to a depth of about 30 inches. (Capability unit VIIe–1.)

Gale Series

The Gale series is made up of moderately deep, silty soils that are well drained. The soils are on ridges and on valley slopes. They generally have convex slopes. The slopes are dominantly between 10 and 20 percent but range from 2 to 30 percent. Depth to the underlying sandstone ranges from 24 to 40 inches.

The Gale soils are closely associated with Hixton and Norden soils and with the valleys soils of the Fayette series. All of these soils developed under a forest cover made up of various kinds of hardwoods.

The Gale soils are fair to good in moisture-supplying capacity and in natural fertility. If they become more eroded, however, their moisture-supplying capacity and natural fertility are likely to be lowered permanently. The hazard of erosion is moderate on the mild slopes and severe on the steeper ones. The sandy substratum makes it difficult to control the gullies that form in these soils. Figure 16 shows a profile of a Gale silt loam.

Gale silt loam, 12 to 20 percent slopes, moderately eroded (GaD2).—This is the most extensive of the Gale soils in the county. Erosion has exposed patches of the yellowish-brown subsoil in many places.

The surface layer is friable, dark grayish-brown silt loam that is 5 to 7 inches thick. The subsoil is yellowish-brown silty clay loam and extends to a depth of 30 inches. Below the subsoil is the sandy substratum, which grades to sandstone bedrock. (Capability unit IVe–2.)

Gale silt loam, 2 to 6 percent slopes, moderately eroded (GaB2).—This soil has lost much of its original surface layer through erosion, but the present surface layer is 7 to 9 inches thick. In areas that have been cultivated, plowing has exposed the yellowish-brown subsoil in a few places. Depth to the sandy substratum is generally more than 30 inches. (Capability unit IIe–2.)

Gale silt loam, 6 to 12 percent slopes, moderately eroded (GaC2).—This soil has lost as much as two-thirds of its original surface layer through erosion. In almost

Figure 16.—**Profile of a Gale silt loam near Mt. Sterling. This soil has bands of finer textured material in the substratum.**

half the acreage, the subsoil, which is lighter colored than the original surface layer, is exposed. The substratum is sandy and is generally at a depth of about 30 inches. Included with the soil are areas of slightly eroded and of severely eroded soils that were too small to map separately. (Capability unit IIIe–2.)

Gale silt loam, 12 to 20 percent slopes (GaD).—Much of this soil has been kept in pasture or woods and is only slightly eroded. The surface layer is 7 to 9 inches thick. The substratum is sandy and is at a depth of about 30 inches. (Capability unit IVe–2.)

Gale silt loam, 20 to 30 percent slopes (GaE).—This soil is only slightly eroded. The surface layer is darker and more friable than that of Gale silt loam, 12 to 20 percent slopes, moderately eroded, and it is 6 to 8 inches thick. Depth to the substratum, which is sandy, is less than 30 inches. (Capability unit VIe–1.)

Gale silt loam, 20 to 30 percent slopes, moderately eroded (GaE2).—This soil has lost as much as two-thirds of the original surface layer through erosion. The present surface layer is 4 to 6 inches thick. In areas that have been cultivated, the yellowish-brown subsoil is exposed in most places. Depth to the sandy substratum is generally less than 24 inches. (Capability unit VIe–1.)

Gotham Series

The Gotham soils are deep and sandy and are somewhat excessively drained. They occur throughout the county on the terraces along the larger streams.

These soils occur in association with Meridian and Sparta soils, and they are intermediate in color between those soils. They are coarser textured to a depth of 2½ feet than the Meridian soils. Their subsoil is slightly finer textured than that of the Sparta soils.

The Gotham soils are low in moisture-storing capacity and in natural fertility. They are subject to erosion by wind and water. Yields are generally low, but, in years of extended drought, they are likely to be even lower than normal. A profile of a Gotham soil is shown in figure 17.

Gotham loamy fine sand, 6 to 12 percent slopes, eroded (GoC2).—This is the most extensive of the Gotham soils in the county. Most of it is on high benches in the valley of the Kickapoo River, but some areas are on the benches of other rivers.

The surface layer is very dark grayish-brown loamy fine sand that is about 6 to 8 inches thick. The upper part of the subsoil, to a depth of 16 inches, consists of brownish sandy loam. The lower part is a lighter colored, brown loamy sand that extends to a depth of 33 inches. Below this is a layer of dark yellowish-brown sand that is several feet thick. In many places, at a depth of more than 36 inches, the substratum has thin bands of reddish-brown sandy loam that are ¼ to ½ inch wide. (Capability unit VIs–3.)

Gotham loamy fine sand, 2 to 6 percent slopes (GoB).—This gently sloping soil is only slightly eroded. It has a thicker surface layer than Gotham loamy fine sand, 6 to 12 percent slopes, eroded, and the substratum is at a greater depth. The surface layer is 10 to 15 inches thick. Included with this soil are a few areas in which slopes are less than 2 percent. These areas were too small to map separately.

Gotham loamy fine sand, 2 to 6 percent slopes, has less hazard of erosion than the steeper Gotham soils. Nevertheless, droughtiness limits its use for crops. (Capability unit IVs–3.)

Gotham loamy fine sand, 2 to 6 percent slopes, eroded (GoB2).—Because of erosion, the surface layer of

Figure 17.—**Profile of a Gotham soil; the B horizon is the area between the dark-colored surface layer and the whitish underlying sand.**

this soil is thinner and slightly lighter colored than that of Gotham loamy fine sand, 2 to 6 percent slopes. Erosion has also decreased the moisture-supplying capacity of the soil. (Capability unit IVs–3.)

Gotham loamy fine sand, 6 to 12 percent slopes (GoC).—This soil is only slightly eroded. The surface layer is, therefore, thicker and darker colored than that of Gotham loamy fine sand, 6 to 12 percent slopes, eroded. The soil is low in moisture-storing capacity and in natural fertility. In dry periods yields of crops are likely to be lower than normal. (Capability unit VIs–3.)

Gullied Land

Gullied land (Gu).—This miscellaneous land type consists of areas that have deep gullies. In some of the areas erosion is still active, and in others it has been controlled. The soil material ranges from silty to sandy in texture.

Gullies are likely to form in soils that are underlain by sand, gravel, and coarse silt, for example, in soils like those on the terrace near Bridgeport. Because of the coarse texture of the substratum, gullies are hard to control once they have cut into the substratum of these soils. Areas that are susceptible to gullying or that are already gullied need to be fenced to prevent grazing by livestock. The gullies should be reseeded to grass or planted to trees (fig. 18).

In some places it is necessary to reshape and slope the banks of the gullies. Structures can then be installed to control the gullying. Practices to control gullying are especially needed if the gullies are cutting into good cropland or are endangering farm buildings. (Capability unit VIIe–1.)

Hesch Series

The Hesch series consists of well-drained soils developed in sandy or loamy materials. These soils are on the south-facing slopes of valleys, below areas of Steep stony and rocky land. Fragments of sandstone generally occur throughout the profile, and sandstone is at a depth ranging from 3 to 5 feet. In some places these soils contain sediments of very fine sand and medium sand in strata of varying thickness. In others the sediments of very fine sand and medium sand are mixed throughout the entire profile.

Figure 18.—**A large gully planted to trees to help control erosion.**

Hesch sandy loam, 12 to 20 percent slopes, moderately eroded (HsD2).—This is the most extensive of the Hesch soils in the county. The surface layer is very dark gray to very dark brown sandy loam and is 8 to 9 inches thick. The subsoil is dark-brown sandy loam or loam and extends to a depth of 36 inches. Below this the substratum of brown fine sand grades to the sandstone bedrock. (Capability unit VIe–1.)

Hesch loam, 20 to 30 percent slopes, moderately eroded (HeE2).—This soil is similar to Hesch sandy loam, 12 to 20 percent slopes, moderately eroded, but it is finer textured and is slightly deeper over bedrock. The surface layer is very dark grayish-brown loam and is 7 to 8 inches thick. The subsoil is dark-brown, heavy loam or sandy clay loam and extends to a depth of about 38 inches. Below this is the substratum of fine sand. The substratum is several feet thick and grades to sandstone bedrock.

The hazard of erosion is serious on this soil because of runoff from the steeper slopes above. (Capability unit VIe–1.)

Hesch loam, 12 to 20 percent slopes (HeD).—The surface layer of this soil is thicker than that of Hesch loam, 20 to 30 percent slopes, moderately eroded, and it contains more organic matter. This soil is only slightly eroded. Nevertheless, if it is used for crops, it needs to be protected to prevent further erosion. (Capability unit IVe–2.)

Hixton Series

The Hixton series consists of well-drained sandy loams, loams, and stony loams that are underlain by sandstone bedrock. The soils occur on valley slopes or ridges. They have slopes that are dominantly moderately steep to very steep.

These soils are associated with Gale and Norden soils. They are similar to the Gale soils, but they do not have a cap of silt over the sandy materials. The sandstone underlying the Hixton soils differs from the sandstone that underlies the Norden soils. The Norden soils are underlain by fine-grained glauconitic sandstone of the Franconia formation.

The Hixton soils are low in moisture-storing capacity and are likely to be droughty in dry years. Many of the areas have been kept in trees or used as pasture. In most places the soils are subject to serious erosion if they are cultivated or overgrazed.

Hixton sandy loam, 12 to 20 percent slopes, moderately eroded (HuD2).—This is the most extensive of the Hixton soils in Crawford County. The surface layer is dark-gray, friable sandy loam and is about 5 inches thick. The subsoil is brown or yellowish-brown sandy loam or loam and extends to a depth of about 30 inches. Underlying this is the yellowish-red, sandy substratum, which is almost 10 inches thick. In some places there are a few bands of yellowish-red sandy loam, 1 to 2 inches wide, in the substratum. Depth to sandstone bedrock is about 42 inches.

This soil has lost as much as two-thirds of its original surface layer as the result of erosion, and patches of the brownish, former subsoil are exposed. Included with the soil are areas of severely eroded soils that were too small to map separately. (Capability unit VIe–1.)

Hixton sandy loam, 2 to 6 percent slopes (HuB).—This soil has a darker, thicker surface layer than Hixton sandy loam, 12 to 20 percent slopes, moderately eroded. Its solum is also slightly thicker.

Included with this soil are areas of moderately eroded soils that were too small to map separately. These included soils have a thinner surface layer than Hixton sandy loam, 2 to 6 percent slopes. In many places patches of brownish material, formerly subsoil, are exposed.

Hixton sandy loam, 2 to 6 percent slopes, is only slightly eroded. It is moderately low in moisture-storing capacity and is droughty in dry periods. The included soils are droughtier than this soil. (Capability unit IIIs–2.)

Hixton sandy loam, 6 to 12 percent slopes, moderately eroded (HuC2).—The surface layer of this soil is lighter colored and thinner than that of Hixton sandy loam, 2 to 6 percent slopes, and the solum is thinner. In many places patches of the brownish, former subsoil are exposed. Included with the soil are a few acres of slightly eroded soils. The surface layer of these included soils is generally somewhat darker, thicker, and more friable than that of Hixton sandy loam, 6 to 12 percent slopes, moderately eroded. If the included areas are cultivated, the surface layer is thick enough so that none of the subsoil is turned up. (Capability unit IVe–3.)

Hixton sandy loam, 12 to 20 percent slopes (HuD).—This soil occupies small, widely scattered areas throughout the county. The areas have been kept in pasture or in trees. As a result, the soil has lost less than one-third of its original surface layer through erosion. The present surface layer is somewhat darker and more friable than that of Hixton sandy loam, 12 to 20 percent slopes, moderately eroded, and none of the brownish subsoil is exposed. (Capability unit VIe–1.)

Hixton sandy loam, 20 to 30 percent slopes (HuE).—Most of this soil is in wooded areas and is only slightly eroded. The surface layer is darker and more friable than that of Hixton sandy loam, 12 to 20 percent slopes, moderately eroded, and is 6 to 7 inches thick. Depth to the sandy substratum is generally less than 30 inches. (Capability unit VIIe–1.)

Hixton sandy loam, 20 to 30 percent slopes, moderately eroded (HuE2).—This soil has lost nearly all of its surface layer and part of its subsoil as the result of erosion. The present surface layer is brown and is low in organic matter. It is less friable than that of Hixton sandy loam, 20 to 30 percent slopes. (Capability unit VIIe–1.)

Hixton sandy loam, 30 to 45 percent slopes (HuF).—The profile of this soil is less well developed than the profiles of the other Hixton sandy loams. The surface layer is generally less than 6 inches thick and contains only a moderate amount of organic matter. In many places bedrock is at a fairly shallow depth. (Capability unit VIIe–1.)

Hixton loam, 20 to 30 percent slopes (HtE).—This soil has always been pastured or kept in trees. Consequently, it is only slightly eroded. The soil is similar to Hixton sandy loam, 12 to 20 percent slopes, moderately eroded, but it has finer materials in the surface layer and subsoil. Also, the sandy substratum is generally at a slightly greater depth.

The surface layer is dark-gray, friable loam and is 6 to 7 inches thick. The subsoil consists of brown or yellowish-brown loam to sandy clay loam and extends to a depth of 30 inches. The underlying material is reddish-yellow sand. Sandstone bedrock is at a depth of about 42 inches. (Capability unit VIe–1.)

Hixton loam, 6 to 12 percent slopes, moderately eroded (HtC2).—This soil has lost as much as two-thirds of its original surface layer through erosion. Much brownish material from the subsoil has been mixed with the remaining surface layer by plowing. (Capability unit IIIe–2.)

Hixton loam, 12 to 20 percent slopes (HtD).—This soil has been used as pasture or kept as woodland. As a result, it is only slightly eroded. The surface layer is darker and more friable than that of Hixton sandy loam, 12 to 20 percent slopes, moderately eroded, and none of the subsoil is exposed. (Capability unit IVe–2.)

Hixton loam, 12 to 20 percent slopes, moderately eroded (HtD2).—This soil has lost much of its original surface layer through erosion. As a result, the present surface layer is lighter colored and less friable than that of Hixton loam, 12 to 20 percent slopes, and it contains less organic matter. In addition, moderate to large areas of the brownish, former subsoil are exposed. (Capability unit IVe–2.)

Hixton loam, 20 to 30 percent slopes, moderately eroded (HtE2).—Erosion has removed much of the original surface layer from this steep soil. The present plow layer contains large amounts of brownish material from the subsoil. Depth to the underlying substratum is generally about 24 inches. (Capability unit VIe–1.)

Hixton stony loam, 20 to 30 percent slopes (HyE).—This soil has a large number of stones on the surface and in the subsoil, but it is otherwise similar to Hixton loam, 20 to 30 percent slopes. Depth to the sandy substratum is generally 24 to 30 inches, but it is as much as 36 inches in places. Because of the stones, the soil has been used as pasture or kept in trees. It is, therefore, only slightly eroded.

The surface layer consists of dark-gray, friable loam that is about 6 inches thick, and it contains many stones. The subsoil is brown to yellowish-brown loam to sandy clay loam. It extends to a depth of about 24 inches and also contains stones. The substratum is reddish yellow and is sandy. It overlies sandstone bedrock. (Capability unit VIIs–3.)

Hixton stony loam, 12 to 20 percent slopes (HyD).—This soil is inextensive. It is similar to Hixton stony loam, 20 to 30 percent slopes, but it has a slightly thicker surface layer and subsoil. (Capability unit VIs–3.)

Jackson Series

The Jackson series is made up of deep, silty soils that are moderately well drained. The soils are nearly level to gently sloping and are on the terraces along streams. They have developed in a layer of silt, 42 or more inches thick, that was laid down by wind and water. These soils are closely associated with Bertrand soils.

The Jackson soils are high in moisture-holding capacity. They are somewhat slow to warm in spring and are likely to remain slightly wet.

Jackson silt loam, 0 to 2 percent slopes (JaA).—This nearly level soil is the most extensive of the Jackson soils in the county. Its surface layer is very dark grayish-brown silt loam that is 7 to 9 inches thick. The subsoil consists of brownish silty clay loam that is mottled at a depth between 24 and 30 inches. It extends to a depth of 36 to 42 inches. The substratum is strongly mottled, yellowish-brown silt loam and is several feet thick.

This soil has only a slight hazard of erosion. In wet periods excess water is likely to stand on the soil and will need to be removed. (Capability unit I–1.)

Jackson silt loam, 2 to 6 percent slopes (JaB).—This soil is similar to Jackson silt loam, 0 to 2 percent slopes, but it has a little stronger slope and a slightly thinner surface layer. Also, depth to mottling is generally somewhat greater. (Capability unit IIe–1.)

Jackson silt loam, 2 to 6 percent slopes, moderately eroded (JaB2).—This soil has lost as much as two-thirds of its original surface layer through erosion. As a result, the present surface layer is about 5 to 7 inches thick. Patches of brownish subsoil are exposed in places. (Capability unit IIe–1.)

Judson Series

The Judson soils are deep and well drained. The areas in which they occur are small, but they are widely distributed throughout the county. Some areas are along small, intermittent streams. Others are on fans on the lower valley slopes where water flows out of drainageways. Still others are at the foot of steep slopes. The soils developed in silty materials washed or sloughed from soils formed under prairie. The silty materials originated in the uplands and were brought by water or gravity to lower lying areas. In some places fragments of chert, deposited as the result of heavy, swift runoff, are on the surface and throughout the profile of these soils. Slopes are as much as 12 percent.

These soils are similar to the Chaseburg soils but have a darker color. The Judson soils are likely to be flooded during periods when runoff is heavy. The water does not stand on the soils but runs off or drains through the profile readily.

Judson cherty silt loam, 6 to 12 percent slopes (JcC).—This soil has many fragments of chert and cobblestones on the surface and throughout the profile. Nevertheless, most of it is used for crops.

The surface layer consists of black cherty silt loam that is 12 inches thick. It overlies very dark brown to very dark grayish-brown gravelly and cobbly loam that extends to a depth of several feet. The number of stones and fragments of chert increases with increasing depth. Although the amount of chert and stones varies from place to place, generally the fragments are not numerous enough to interfere with tillage. (Capability unit IIIe–11.)

Judson cherty silt loam, 2 to 6 percent slopes (JcB).—This soil has a thicker surface layer than Judson cherty silt loam, 6 to 12 percent slopes. Generally, it contains fewer cobblestones and fewer fragments of chert. (Capability unit IIw–11.)

Judson silt loam, 0 to 6 percent slopes (JdB).—This gently sloping soil has a surface layer of very dark gray to black silt loam that is 24 inches thick. This is underlain by very dark grayish-brown to very dark brown silt loam that extends to a depth of 42 inches or more.

Figure 19.—**Areas of Lindstrom soils in Haney Valley. These soils are on the side slopes between the steeper, wooded hillsides and the more nearly level terrace area that is planted to corn.**

The surface layer of this soil contains a large amount of plant nutrients and organic matter. As a result, this soil is among the most desirable in the county for agriculture. (Capability unit IIw–11.)

Lindstrom Series

The Lindstrom series consists of deep, silty soils that are well drained. These soils are on concave valley slopes below areas of steep upland soils (fig. 19). Their parent material came from deep deposits of loess. In places the soils have grit and stones on the surface and throughout the profile. The soils are gently sloping to steep, but slopes are predominantly between 12 and 20 percent.

These soils are similar to the valleys soils of the Fayette series. The Fayette soils, however, formed under forest rather than prairie. The Lindstrom soils are high in natural fertility and have good moisture-supplying capacity. They are very susceptible to erosion.

Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded (LsD2).—Much of the original surface layer of this soil has been lost through erosion. In some places patches of the brownish, former subsoil are exposed.

The surface layer consists of very dark brown silt loam and is 6 to 8 inches thick. The subsoil is very dark yellowish-brown, light silty clay loam. The substratum is dark yellowish-brown silt loam. It extends to a depth of about 42 inches, but it varies in thickness. Underlying this, in many places, is a mixture of fine to coarse soil material that contains fragments of sandstone, limestone, and chert. (Capability unit IVe–1.)

Lindstrom silt loam, 2 to 6 percent slopes (LsB).—The surface layer of this inextensive soil is about 12 to 14 inches thick. The soil can be farmed fairly intensively. (Capability unit IIe–1.)

Lindstrom silt loam, 6 to 12 percent slopes (LsC).—This soil is similar to Lindstrom silt loam, 2 to 6 percent slopes, but it has stronger slopes and a slightly thinner surface layer. Also, it has a greater susceptibility to erosion. (Capability unit IIIe–1.)

Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded (LsC2).—The surface layer of this soil is 8 to 10 inches thick. As the result of erosion, a few small patches of the lighter colored former subsoil are exposed. (Capability unit IIIe–1.)

Lindstrom silt loam, 12 to 20 percent slopes (LsD).—This soil has been used less intensively for pasture than Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded, or has been kept in trees. Consequently, most of its original surface layer is intact. The present surface layer is darker, thicker, and has a higher content of organic matter than that of Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded. (Capability unit IVe–1.)

Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded (LsE2).—This soil has a thinner surface soil and a thinner solum than Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded. Brownish patches, where the former subsoil has been exposed, are apparent in areas that have been cultivated. Included with the soil are areas of slightly eroded soils that were too small to map separately. (Capability unit VIe–1.)

Medary Series

The Medary soils are deep and are moderately well drained. They occur on stream terraces. The terraces are along most of the tributary streams at the point where the streams flow into the Wisconsin or Mississippi Rivers. The soils have a silty surface layer, and reddish-brown clay is at a shallow depth. The clayey material was laid down by slack waters of the Wisconsin and Mississippi Rivers. The soils are nearly level to gently sloping.

These soils are associated with the Bertrand soils; they differ from those soils in having a subsoil of heavy clay, rather than silt. Because of their clayey subsoil and substratum, internal drainage is moderately slow.

Medary silt loam, 0 to 2 percent slopes (MdA).—This soil is the most extensive of the Medary soils in the county. It has a surface layer of dark grayish-brown to very dark grayish-brown silt loam that is 8 to 9 inches thick. The upper part of the subsoil is reddish-brown silty clay loam that extends to a depth of 14 inches; the lower part is reddish-brown silty clay that is slightly mottled in places. The subsoil extends to a depth of 30 inches. Below it is mottled, reddish-brown silty clay that extends to a depth of several feet. The clay is lighter colored with increasing depth. (Capability unit IIe–6a.)

Medary silt loam, 2 to 6 percent slopes (MdB).—Because of its stronger slopes, water runs off this soil more readily than from Medary silt loam, 0 to 2 percent slopes. As a result, this soil is slightly eroded and has a surface layer that is only 7 to 8 inches thick. Included with this soil are areas of moderately eroded soils that were too small to map separately. The surface layer of the included soils is slightly thinner than that of Medary silt loam, 2 to 6 percent slopes. If the included areas are plowed, small patches of the brownish, former subsoil are exposed. (Capability unit IIe–6b.)

Medary silt loam, 6 to 12 percent slopes, moderately eroded (MdC2).—This soil has lost as much as two-thirds of its original surface layer through erosion. The present surface layer is lighter colored, contains less organic matter, and is less permeable than that of Medary silt loam, 0 to 2 percent slopes. Also, depth to mottling is generally greater. In many places plowing has exposed patches of reddish-brown material from the former subsoil. Included with this soil are areas of slightly eroded soils that were too small to map separately. (Capability unit IIIe–6.)

Meridian Series

The Meridian soils are moderately deep and are well drained. They developed in sandy outwash materials on stream terraces. These soils are associated with Dakota, Gotham, and Sparta soils that are also sandy. The Meridian soils are lighter colored than the Dakota soils and finer textured than the Gotham and Sparta soils.

These soils are moderate in natural fertility and in moisture-holding capacity. During dry periods, they are likely to be droughty. If used intensively for crops, these soils are subject to erosion by wind and water.

Meridian sandy loam, 2 to 6 percent slopes (MsB).—This is the most extensive Meridian soil in the county. The surface layer is very dark grayish-brown sandy loam and is 8 to 10 inches thick. The subsoil is dark-brown sandy loam to loam and extends to a depth between 24 and 28 inches. Below the subsoil is the substratum, which consists of brown to yellowish-brown fine sand that is several feet thick. (Capability unit IIIs–2.)

Meridian sandy loam, 0 to 2 percent slopes (MsA).—This soil has milder slopes than Meridian sandy loam, 2 to 6 percent slopes, and a slightly darker, thicker surface layer. It is also less subject to erosion. (Capability unit IIIs–2.)

Meridian sandy loam, 2 to 6 percent slopes, moderately eroded (MsB2).—This soil has lost as much as two-thirds of its original surface layer through erosion. The present surface layer is lighter colored than that of Meridian sandy loam, 2 to 6 percent slopes. It is also less friable and less permeable. In some places small patches of the brownish, former subsoil are exposed. (Capability unit IIIs–2.)

Meridian sandy loam, 6 to 12 percent slopes, moderately eroded (MsC2).—The surface layer of this soil is thinner than that of Meridian sandy loam, 2 to 6 percent slopes, and it contains less organic matter. The soil has already lost as much as two-thirds of its original surface layer, and there is a severe hazard of erosion. If gullies cut into this soil, they would be difficult to control because of the strong slopes and the sandy texture of the substratum. Included with this soil are areas of a slightly eroded soil that were too small to map separately. (Capability unit IVe–3.)

Meridian loam, 6 to 12 percent slopes, moderately eroded (MmB2).—This soil is similar to Meridian sandy loam, 6 to 12 percent slopes, moderately eroded, but it has a finer textured surface layer and subsoil. Also, depth to the substratum is generally slightly greater. The surface layer of this soil is dark-brown loam that extends to a depth of 5 to 7 inches. This is underlain by a layer of dark-brown sandy clay loam that is 28 to 32 inches thick. The substratum is yellowish-brown to brown fine sand that extends to a depth of several feet.

On this soil, erosion by water is a serious hazard. Because of the sandy texture and loose consistence of its

substratum, gullies are likely to cut deep into it. (Capability unit IIIe–2.)

Meridian loam, 0 to 2 percent slopes (MmA).—This nearly level soil has a thicker surface layer than Meridian loam, 6 to 12 percent slopes, moderately eroded. Its solum is also deeper. (Capability unit IIs–1a.)

Meridian loam, 2 to 6 percent slopes (MmB).—This soil is similar to Meridian loam, 0 to 2 percent slopes, but it has stronger slopes and a slightly thinner surface layer. There is also a more serious hazard of erosion. (Capability unit IIs–1b.)

Norden Series

The Norden soils are loamy and well drained. They overlie fine-grained sandstone that contains seams of glauconitic material, siltstone, and shale of the Franconia formation. The soils are on the upper valley slopes below areas of Steep stony and rocky land. They lie above the deep, silty soils of the lower valley slopes. These soils are associated with Gale and Hixton soils, but they have a finer textured substratum than those soils. Also, their water-holding capacity and ability to supply plant nutrients are higher.

The texture of the surface layer ranges from fine sandy loam to silt loam in the Norden soils. The amount of glauconitic material in the subsoil also varies, as does the proportion of material weathered from sandstone, siltstone, and shale in the substratum.

Norden fine sandy loam, 20 to 30 percent slopes (NoE).—This is the most extensive of the Norden soils in the county. Because the areas have been used as pasture or woodland, the soil is only slightly eroded.

The surface layer consists of dark grayish-brown fine sandy loam that is 6 to 8 inches thick. It is underlain by a subsoil of yellowish-brown loam. At a depth of about 32 inches, there is light yellowish-brown to pale-yellow, disintegrated glauconitic sandstone that is very fine grained. The bedrock consists of layers of greenish sandstone, siltstone, and shale. (Capability unit VIe–1.)

Norden fine sandy loam, 12 to 20 percent slopes (NoD).—This soil has a slightly thicker surface layer and a deeper solum than Norden fine sandy loam, 20 to 30 percent slopes, but the two soils are similar. The surface layer is 7 to 9 inches thick. (Capability unit IVe–7.)

Norden fine sandy loam and loam, 12 to 20 percent slopes, moderately eroded (NsD2).—These soils have a surface layer that ranges in texture from fine sandy loam to loam and is about 5 to 7 inches thick. In areas that have been cultivated, patches of yellowish-brown material from the former subsoil have been turned up. Mapped with these soils are areas of Norden silt loams that were too small to delineate separately. (Capability unit IVe–7.)

Norden fine sandy loam and loam, 20 to 30 percent slopes, moderately eroded (NsE2).—These soils have a lower content of organic matter and a slower rate of permeability than Norden fine sandy loam and loam, 12 to 20 percent slopes, moderately eroded. The plow layer contains large amounts of yellowish-brown material from the subsoil. Mapped with these soils are areas of Norden silt loams and of Gale silt loams that were too small to delineate separately. (Capability unit VIe–1.)

Norden fine sandy loam and loam, 30 to 45 percent slopes (NsF).—These steep soils have been used mainly as pasture or woodland. As a result, most of the original surface layer is intact. The solum is 24 to 30 inches thick, or thinner than that of the other Norden soils in the county. (Capability unit VIIe–1.)

***Figure 20.*—Orion silt loam along a stream in Marietta Valley; the wooded area in the background is Steep stony and rocky land.**

Orion Series

The Orion soils are somewhat poorly drained and are nearly level. They occur on bottom lands along most of the streams in the county. The soils developed in silty materials washed from the uplands (fig. 20). They are closely associated with the Arenzville soils. The Orion soils are less well drained than the Arenzville soils and generally occur in lower positions on the bottom lands.

In the Orion soils, there is an old, dark, buried soil at a depth between 1½ and several feet. In some places there are many layers of very fine sand in the profile. Flooding varies in frequency, and there is an intermittent high water table.

These soils are neutral in reaction and have high natural fertility. They are favorable for crops.

Orion silt loam (Or).—The surface layer of this soil consists of stratified layers of grayish-brown, mottled silt loam and is about 18 inches thick. At depths of 18 to 30 inches is a layer of black silt loam, which is the former surface layer of an old, buried soil. Underlying this is very dark grayish-brown, mottled silty clay loam that extends to a depth of 42 inches. The soil has slopes of 0 to 2 percent.

Most of this soil is used for crops and pasture, but some areas have been left in trees. Because of variable flooding and somewhat poor drainage, however, the soil is of limited use for crops. (Capability unit IIIw–14.)

Orion silt loam, poorly drained variant (Ow).—This deep, poorly drained soil occurs on bottom lands along many of the streams in the county. It is in low, flat areas near the mouths of streams or in depressions along the streams.

In a profile of this soil observed in Johnstown Valley, the upper part of the profile consists of mottled, very dark grayish-brown to very dark gray, stratified silt loam. At a depth of 30 inches is a layer of black silt loam that is the former surface layer of an old, buried soil. This is underlain by mottled, dark grayish-brown silt

loam, which is at a depth of 48 inches. The water table is at a depth of 3½ feet.

This soil receives water as the result of flooding. It also receives water from springs and artesian wells. Consequently, it has a high water table throughout the entire year. The water table is usually at a depth of about 3½ feet.

Because of its low position, this soil is difficult to drain, and many of the areas have no suitable outlets. Most of the soil, therefore, is used for pasture or has been left in trees. (Capability unit Vw-15.)

Richwood Series

The Richwood series consists of deep, silty soils that are well drained. The soils are on stream benches or terraces. They developed under prairie grasses in a layer of silt 42 or more inches thick that was laid down by wind and water. These soils are closely associated with the Toddville and Rowley soils, but they are better drained than those soils.

The Richwood soils are high in natural fertility and in moisture-supplying capacity. They respond well to good management and are among the most desirable soils in the county for agriculture.

Richwood silt loam, 0 to 2 percent slopes (RcA).—This is the most extensive of the Richwood soils in the county. The surface layer is black silt loam that is 12 to 18 inches thick. The subsoil is dark-brown or dark yellowish-brown silty clay loam and extends to a depth of 42 inches. The substratum is dark yellowish-brown silt loam. The silt loam extends to a depth of several feet in many places and then grades to sandy material. (Capability unit I-1.)

Richwood silt loam, 2 to 6 percent slopes (RcB).—This soil has a slightly thinner surface layer than Richwood silt loam, 0 to 2 percent slopes, and the surface layer contains less organic matter. Because of its stronger slopes and the position in which it occurs, the soil is subject to erosion by runoff from higher lying areas. (Capability unit IIe-1.)

Richwood silt loam, 6 to 12 percent slopes (RcC).—This soil has stronger slopes and a thinner surface layer than Richwood silt loam, 0 to 2 percent slopes. It also has a more serious hazard of erosion. Included with the soil are areas of moderately eroded soils that were too small to map separately. (Capability unit IIIe-1.)

Rowley Series

The Rowley soils are deep and silty and are somewhat poorly drained. They are on stream benches or terraces, mainly in the Citron and Haney Valleys. Smaller areas, however, are scattered throughout the county. These soils developed in deep deposits of silt that were laid down by wind and water. They are associated with Richwood and Toddville soils but are not so well drained as those soils.

The Rowley soils have only a slight susceptibility to erosion. Tile drains work well.

Rowley silt loam, 0 to 2 percent slopes (RoA).—This is the most extensive Rowley soil in the county. Because it is nearly level, surface drainage is slow.

The surface layer is very dark gray silt loam that is 10 to 15 inches thick. The upper part of the subsoil is mottled, brownish, light silty clay loam, and the lower part is grayish-brown, mottled silty clay loam that extends to a depth of about 42 inches. Below this is the substratum of grayish silt that is several feet thick. (Capability unit IIw-1a.)

Rowley silt loam, 2 to 6 percent slopes (RoB).—This soil has better surface drainage than Rowley silt loam, 0 to 2 percent slopes. Nevertheless, in many places surface drains or tile drains are needed to help carry off excess water. (Capability unit IIw-1b.)

Seaton Series

The Seaton soils are deep and silty and are well drained. They occur only on the terrace near Bridgeport. These soils developed in coarse silt laid down by wind, but they are underlain by very fine sand at a depth of more than 4 feet. At a depth of 7 feet or more is dolomitic limestone of the Prairie du Chien formation, or granitic gravel outwash, or both. Slopes are predominantly moderately strong but range from gently sloping to steep.

These soils are similar to the Fayette soils, but they developed in coarser textured silt and have less profile development. Because of their billowy relief and the coarse texture of their underlying material, gullying is a severe hazard. The gullies cut rapidly into the soil and are difficult to control.

Seaton silt loam, 12 to 20 percent slopes, moderately eroded (SeD2).—This soil has lost as much as two-thirds of its original surface layer through erosion. In many places the brownish, former subsoil has been exposed. Included with the soil are areas of severely eroded and of steep soils that were too small to map separately.

Seaton silt loam, 12 to 20 percent slopes, moderately eroded, has a surface soil of very dark grayish-brown, light silt loam that is 4 to 5 inches thick. The subsoil extends to a depth of about 36 inches. It consists of brownish, heavy silt loam that grades to lighter, or coarser, silt loam with increasing depth. Yellowish-brown sand is at a depth of about 56 inches, and limestone bedrock is at a depth of about 80 inches. (Capability unit IVe-1.)

Seaton silt loam, 2 to 6 percent slopes, moderately eroded (SeB2).—This soil has a thicker surface layer than Seaton silt loam, 12 to 20 percent slopes, moderately eroded. The surface layer is 6 to 7 inches thick. Only small patches of the brownish, former subsoil have been exposed as the result of erosion. (Capability unit IIe-1.)

Seaton silt loam, 6 to 12 percent slopes, moderately eroded (SeC2).—This sloping soil has lost as much as two-thirds of its original surface layer as the result of erosion. The present surface layer is 5 to 6 inches thick. Moderate amounts of brownish, former subsoil have been exposed in the plow layer. (Capability unit IIIe-1.)

Sparta Series

The Sparta series consists of somewhat excessively drained soils on stream terraces. The soils developed under prairie grasses in sandy deposits. The solum is made up of loamy fine sand to a depth of 18 to 24 inches. The loamy fine sand overlies loose sand. Slopes are as much as 12 percent but are dominantly less than 3 percent. The Sparta soils are associated with Dakota soils.

They are not so well developed as those soils and have a coarser texture.

The Sparta soils are not suited to intensive cultivation. They are low in natural fertility and in moisture-holding capacity. If they are not kept under a cover of vegetation, they are likely to blow.

Sparta loamy fine sand, 0 to 2 percent slopes (SsA).—Most of this soil is near Prairie du Chien. It is the most extensive of the Sparta soils in the county.

The surface layer is black to very dark brown loamy fine sand and is 12 to 18 inches thick. It is underlain by dark-brown loamy sand that extends to a depth of about 24 inches. Below this is yellowish-brown, loose sand that extends to a depth of several feet. (Capability unit IVs-3.)

Sparta loamy fine sand, 2 to 6 percent slopes (SsB).—This soil is on broad rises and in depressions. It is similar to Sparta loamy fine sand, 0 to 2 percent slopes, but it has stronger slopes and is subject to erosion by wind and water. The surface layer in the areas on the rises is thinner than that in the areas in depressions. (Capability unit IVs-3.)

Sparta loamy fine sand, 2 to 6 percent slopes, eroded (SsB2).—This soil occurs on broad rises and in depressions. The areas on rises have been especially damaged by erosion, but all of the soil has lost as much as two-thirds of the original surface layer. As a result, this soil is more droughty than Sparta loamy fine sand, 0 to 2 percent slopes, and it is less productive. (Capability unit IVs-3.)

Sparta loamy fine sand, 6 to 12 percent slopes (SsC).—This soil is more droughty than Sparta loamy fine sand, 0 to 2 percent slopes. Erosion is a serious hazard if the soil is used for crops. (Capability unit VIIs-3.)

Sparta loamy fine sand, 6 to 12 percent slopes, eroded (SsC2).—This soil has lost as much as two-thirds of its original surface layer through erosion. Generally, the surface layer has a browner color and is lower in moisture-holding capacity than that of Sparta loamy fine sand, 0 to 2 percent slopes. The soil is limited in its use for crops. (Capability unit VIIs-3.)

Steep Stony and Rocky Land

Steep stony and rocky land (St).—This miscellaneous land type is made up of shallow soil materials in which there are many large boulders and rock outcrops. The land type consists of steep breaks or escarpments and is between the upland ridges and the lower valley slopes. It has slopes ranging from 30 to 60 percent.

The soil materials making up this land type range in texture from sand to silt. They have developed in a thin layer of loess that overlies materials weathered from sandstone or limestone bedrock. In many places there are bluffs where bedrock is exposed. Runoff is rapid on this land type, and the hazard of erosion is severe. (Capability unit VIIs-3.)

Stony Colluvial Land

Stony colluvial land (Su).—This miscellaneous land type is made up of various kinds of soil materials, and it contains many stones. Some areas are along steep drainageways in which water flows from the uplands to lower lying areas. Others are at the foot of valley slopes where soil materials have been deposited. Still others are on bottom lands where water flows from the drainageways. The areas are generally small and are widely scattered throughout the county. Slopes are as much as 20 percent. Most of the areas are in permanent vegetation. (Capability unit VIIs-3.)

Tell Series

The Tell soils are silty and well drained. They occur on terraces and are underlain by sand and gravel. Depth to the sand or gravel ranges from 24 to 40 inches, but, generally, it is between 24 and 32 inches. These soils are similar to the Bertrand soils, but they are shallower than the Bertrand soils.

In most places in the Bridgeport terrace area, these soils are underlain by granitic gravel. In a few places in that area, however, the underlying material is sand, which is at a shallower depth than in the typical soils. Slopes are as much as 20 percent. Because of the billowy topography and the coarse texture of the underlying material, the Tell soils are susceptible to severe erosion. Also, during prolonged dry periods, they are likely to be droughty.

Tell silt loam, 2 to 6 percent slopes, moderately eroded (TeB2).—This soil has lost as much as two-thirds of the original surface layer through erosion. In places patches of the brownish, former subsoil are exposed.

The surface layer is dark-brown silt loam and is 5 to 8 inches thick. The upper part of the subsoil is brownish, heavy loam, but the lower part is dark yellowish-brown sandy clay loam. Depth to the substratum, which is a yellowish-brown sand, is 26 inches. (Capability unit IIs-1b.)

Tell silt loam, 0 to 2 percent slopes (TeA).—This nearly level soil has a thicker surface layer than Tell silt loam, 2 to 6 percent slopes, moderately eroded. It is also less subject to erosion and is only slightly eroded. The surface layer is 8 to 10 inches thick. (Capability unit IIs-1a.)

Tell silt loam, 6 to 12 percent slopes, moderately eroded (TeC2).—As much as two-thirds of the original surface layer of this soil has been lost through erosion. The present surface layer is 4 to 7 inches thick. Fairly large patches of the brownish, former subsoil have been exposed in the plow layer. (Capability unit IIIe-2.)

Tell silt loam, 12 to 20 percent slopes, moderately eroded (TeD2).—This soil has lost all but 3 to 5 inches of its original surface layer through erosion. In areas that have been cultivated, plowing has mixed large amounts of brownish material from the subsoil with the remaining surface soil. Included with this soil are areas of severely eroded soils that were too small to map separately. These are in the Bridgeport terrace area. (Capability unit IVe-2.)

Terrace Escarpments

This miscellaneous land type is along stream terraces. It is made up of soils that occur in long, narrow strips. The areas are between terraces at two different levels, and slopes are moderately steep to steep (fig. 21). The surface layer of the soils is sandy or loamy, and the texture in the rest of the profile ranges from sandy to silty.

Figure 21.—**Soils on Terrace escarpments in Marietta Valley.**

Runoff is rapid. The hazard of erosion is severe, and the soils are already slightly to severely eroded. Some areas have been cut by deep gullies. The soils are difficult to use and manage. Generally, they are not suited to cultivation.

Terrace escarpments, sandy (Ts).—This miscellaneous land type is made up of Dakota, Gotham, Meridian, and Sparta soils that have slopes of 12 to 45 percent. The soils are in many small, ribbonlike areas between terraces that are at two different levels. Most of the areas are along the lower reaches of the major streams. In the valley of the Kickapoo River, however, the areas are scattered along the entire length of the river.

The soils are low in moisture-holding capacity, and there is a severe hazard of erosion. They are not suited to cultivated crops and are probably best kept in pasture, trees, or other permanent vegetation. (Capability unit VIIs-3.)

Terrace escarpments, loamy (Tr).—This miscellaneous land type is made up of Bertrand, Jackson, Medary, Richwood, and Tell soils that have slopes of 12 to 45 percent. The soils have a finer textured surface layer and subsoil than the soils in Terrace escarpments, sandy, and they are more productive.

These soils are moderate in fertility and in moisture-supplying capacity, but the hazard of erosion is severe. Generally, the areas are not suited to cultivated crops and are probably best kept in permanent pasture or in trees. (Capability unit VIe-1.)

Toddville Series

The Toddville soils are deep and are moderately well drained. They are mainly in the Citron and Haney Valleys, but small areas are scattered throughout the county. The soils are on stream terraces. They have developed under prairie grasses in silt that was laid down by wind and water. The silt is 42 or more inches deep.

The Toddville soils are closely associated with well-drained Richwood and somewhat poorly drained Rowley soils. They are among the most desirable soils in the county for agriculture. If well managed, they are highly productive.

Toddville silt loam, 0 to 2 percent slopes (TvA).—This is the most extensive of the Toddville soils in the county. The surface layer consists of black to very dark brown silt loam and is 11 to 16 inches thick. The upper part of the subsoil is dark-brown silt loam, but the lower part is dark-brown silty clay loam. The subsoil extends to a depth of 36 to 44 inches and is slightly mottled in the lower part. Below it is dark-brown, distinctly mottled silt loam that generally extends to a depth of several feet. (Capability unit I-1.)

Toddville silt loam, 2 to 6 percent slopes (TvB).—This soil is similar to Toddville silt loam, 0 to 2 percent slopes, but it has gentle slopes and a slightly thinner surface layer. Included with this soil are areas in which slopes are 6 to 12 percent. These areas were too small to map separately.

In many places water flows onto this soil from higher lying areas. These areas will need protection from runoff to keep the soil from becoming eroded. (Capability unit IIe-1.)

Waukegan Series

The Waukegan series is made up of loamy, well-drained soils that are underlain by sand and fine gravel at depths ranging from 24 to 40 inches. The soils developed under prairie grasses and are on terraces. They are associated with the Dakota and Richwood soils. The Waukegan soils developed in siltier materials than the Dakota soils and are shallower over sand than the Richwood soils.

Only one soil of this series—Waukegan loam—is mapped in this county.

Waukegan loam (Wa).—The surface layer of this soil is black loam and is 8 to 12 inches thick. The subsoil is dark grayish-brown to dark-brown silty clay loam and extends to a depth of 36 inches. Below this is the substratum, which is several feet thick and consists of yellowish-brown sand. Slopes range from 0 to 2 percent. Because of the sandy material in the substratum, the soil is likely to be droughty in dry years. (Capability unit IIs-1a.)

Use and Management of the Soils

This section has several parts. The first explains the system of capability classification used by the Soil Conservation Service. Next is a discussion of basic practices of management that apply to all of the soils. Then, management of the capability groups of the soils is described, and this description is followed by a discussion of estimated yields. The part that follows the section about estimated yields gives information about the management of the soils for woodland. Finally, the engineering properties of the soils are discussed.

Capability Groups of Soils

The capability classification is a grouping of soils that shows, in a general way, how suitable they are for most kinds of farming. It is a practical grouping based on the limitations of the soils, on the risk of damage when they are used, and on the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels, the capability class, subclass, and unit. The eight capability classes in the broadest grouping are

designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes, there can be as many as four subclasses. The subclass is indicated by adding a small letter, *e*, *s*, *w*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; *w* means that water in or on the soil will interfere with the growth of plants or with cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *c*, used in only some parts of the country, indicates that the chief limitation is a climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *s*, *w*, and *c* because the soils in it have little or no susceptibility to erosion but have other limitations that limit their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units, groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping of soils for many statements about their management. Capability units are generally identified by Arabic numbers assigned locally, for example, IIe-1, IIe-6a, or IIIe-2.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations. The grouping does not take into consideration major, and generally expensive, landforming that would change the slope, depth, or other characteristics of the soil. It also does not take into consideration possible, but unlikely, major reclamation projects.

The capability classes, subclasses, and units in which the soils of Crawford County are classified are defined in the listing that follows. The soils were assigned to capability units on a statewide basis. Because not all of the capability units in the State are represented in this county, the numbering of the units may not be consecutive. For example, no soils of capability unit IIe-3 have been recognized in Crawford County; therefore, this capability unit is not discussed in this report.

Class I.—Soils that have few limitations that restrict their use.
- Unit I-1: Deep, well drained to moderately well drained, nearly level soils.

Class II.—Soils that have some limitations that reduce the choice of plants or that require moderate conservation practices.
- Subclass IIe.—Soils subject to moderate risk of erosion if they are not protected.
  - Unit IIe-1: Deep, well drained to moderately well drained, gently sloping soils that have friable subsoils.
  - Unit IIe-2: Moderately deep, well-drained, gently sloping soils that are underlain by sand or clay over bedrock.
  - Unit IIe-6a: Moderately well drained, nearly level soil that is underlain by somewhat slowly permeable, red clay.
  - Unit IIe-6b: Moderately well drained, gently sloping soil that is underlain by somewhat slowly permeable, red clay.
- Subclass IIs.—Soils that have moderate limitations of moisture capacity and tilth.
  - Unit IIs-1a: Moderately deep, well-drained, nearly level soils that are underlain by loose sand.
  - Unit IIs-1b: Moderately deep, well-drained, gently sloping soils that are underlain by loose sand.
- Subclass IIw.—Soils that have moderate limitations because of excess water.
  - Unit IIw-1a: Deep, poorly drained or somewhat poorly drained, silty soils that are nearly level.
  - Unit IIw-1b: Deep, somewhat poorly drained, silty soil that is gently sloping.
  - Unit IIw-11: Deep, well drained to moderately well drained, silty soils that are nearly level to gently sloping and are subject to occasional flooding.

Class III.—Soils that have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.
- Subclass IIIe.—Soils subject to severe erosion if they are cultivated and not protected.
  - Unit IIIe-1: Deep, silty, well-drained, sloping soils.
  - Unit IIIe-2: Shallow to moderately deep, well-drained, sloping soils that are underlain by loose sand, gravel, or bedrock.
  - Unit IIIe-6: Moderately deep, moderately well drained, sloping soil that is underlain by slowly permeable material.
  - Unit IIIe-11: Deep, moderately well drained to well drained, sloping soils that are subject to frequent overflow.
- Subclass IIIs.—Soils that have severe limitations of moisture capacity or tilth.
  - Unit IIIs-2: Moderately deep, well-drained soils that are underlain by sandstone or by loose sand and gravel.
- Subclass IIIw.—Soils that have severe limitations because of excess water.
  - Unit IIIw-14: Moderately well drained to somewhat poorly drained soils that are subject to flooding.

Class IV.—Soils that have very severe limitations that restrict the choice of plants, or that require very careful management, or both.
- Subclass IVe.—Soils subject to very severe erosion if they are cultivated and not protected.
  - Unit IVe-1: Deep, well-drained, silty soils.
  - Unit IVe-2: Moderately deep, well-drained, silty soils that are underlain by sand or by red clay over bedrock or deep sand.

Unit IVe–3: Moderately deep, well-drained sandy loams that are underlain by loose sand and gravel or by sandstone.

Unit IVe–5: Somewhat shallow, well-drained, sloping soil that contains scattered fragments of chert.

Unit IVe–7: Moderately deep, well-drained soils that are underlain by medium-textured material.

Subclass IVs.—Soils that have very severe limitations of low moisture capacity.

Unit IVs–3: Deep, somewhat excessively drained, sandy soils that are subject to rapid leaching.

Class V.—Soils not likely to erode but that have other limitations, impractical to remove without major reclamation, that limit their use largely to pasture, to woodland, or to food and cover for wildlife.

Subclass Vw.—Soils too wet for cultivation; drainage or protection not feasible.

Unit Vw–15: Poorly drained, nearly level, mixed silty, sandy, or gravelly soils that are subject to frequent overflow.

Class VI.—Soils that have severe limitations that make them generally unsuitable for cultivation and that limit their use largely to pasture, woodland, or wildlife.

Subclass VIe.—Soils severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIe–1: Moderately deep to deep, medium- to coarse-textured soils underlain by sand, sandstone, or red clay.

Subclass VIs.—Soils generally unsuitable for cultivation and limited for other uses by their moisture capacity, stones, or other features.

Unit VIs–3: Moderately deep to deep, sandy or stony soils that are sloping to moderately steep.

Class VII.—Soils that have very severe limitations that make them unsuitable for cultivation without major reclamation and that restrict their use largely to grazing, woodland, or wildlife.

Subclass VIIe.—Soils very severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIIe–1: Moderately deep to deep, steep medium- to coarse-textured soils.

Subclass VIIs.—Soils very severely limited by low moisture-holding capacity, stones, or other soil features.

Unit VIIs–3: Moderately deep to deep, droughty, sandy, stony, or rocky soils, that are sloping to very steep.

Class VIII.—Soils and land types that have limitations that preclude their use, without major reclamation, for commercial production of plants and that restrict their use to recreation, wildlife, or water supply. (None in Crawford County.)

Basic Practices of Management

In the following pages management practices suitable for all of the soils of Crawford County are discussed. In addition to these management practices, however, the farmer will also need to take into account all of the resources available on his particular farm. Besides the soils, livestock, and machinery and other equipment, the labor and capital available need to be considered.

Maintain good tilth.—Maintaining good soil structure, or tilth, in the soils that are farmed is always important, especially if steep slopes are farmed. Studies at the Upper Mississippi Valley Conservation Experiment Station at La Crosse show that in soils that have good structure, more water enters the soil and less runs off than in soils in which structure has deteriorated. If good structure is maintained, erosion is less serious and more water is available for crops (*4*).

Good tilth is required for a firm, fine, granular seedbed. Such a seedbed is especially needed for alfalfa, grass, and other small-seeded crops. These sod-forming crops improve the structure or tilth of the soil. This is partly because such crops require no tillage, and partly because soil bacteria act to decay the organic matter or residue from the roots of the sod crop. In addition, sod-forming crops keep a cover on the land, thus helping to reduce erosion.

Supply organic matter.—Barnyard manure, green manure, crop residues, or other organic matter applied to soils is effective in several ways. It causes crops to produce higher yields, improves the structure of the soil, increases the intake of water, decreases runoff, and reduces erosion. In addition, organic matter helps to reduce wind erosion on sandy soils. It also increases the water-storing capacity and the supply of plant nutrients in the soil. Most of the soils of Crawford County need organic matter, especially soils that are sandy or steep. Some organic matter is supplied by decaying roots, but all of the crop residues, barnyard manure, and green manure available must be used if the soils are to have an adequate supply of organic matter. Although the Richwood and similar dark-colored soils were originally high in organic matter, they have been cropped for many years. As a result, most of the remaining original organic matter now is in a form that cannot be used by plants. Frequent additions of organic matter will, therefore, benefit these darker colored soils as well as the lighter colored ones.

Apply lime and fertilizer.—Most of the soils of Crawford County have been farmed for about 100 years. Much of the natural supply of plant nutrients has been exhausted, and many of the soils are now more acid than they were originally. Consequently, lime and a commercial fertilizer that contains phosphorus and potassium are widely used. Most farmers also use a fertilizer containing nitrogen. To determine if lime and fertilizer are needed, the soils should be tested. Then apply lime and fertilizer according to the needs indicated.

Most of the silty soils in the county were originally fairly high in lime. Now, they are leached to a depth of 6 to 8 feet and are acid. If tests show the soil to be acid, enough ground limestone ought to be applied to correct acidity, because most crops grow best if the soils are mildly alkaline. Sandy soils generally require less lime than the silty soils. Changes in soil acidity affect the ability of the soil to supply nutrients to plants. Phosphorus, for example, is readily available to plants if the reaction of the soil is mildly alkaline, but it becomes increasingly less available as the acidity of the soil increases.

For best yields, use other good management practices,

Figure 22.—**Contour stripcropping on narrow upland ridges in the county; hay crops are grown in strips alternating with a small grain or corn.**

as well as adding lime and fertilizer. Good practices are the use of crop varieties that are suited to a particular soil, timely seeding and cultivation, and control of weeds and insects.

Use a suitable cropping system.—One of the keys to good soil management is a good cropping system. If a suitable cropping system is used, the tilth of the soil is improved, organic matter is supplied, and erosion is controlled. In addition, the use of a suitable cropping system provides the variety of crops needed in dairy farming.

In planning a cropping system and the accompanying practices to conserve the soil and maintain fertility, the soils of the entire farm must be considered. The better, more nearly level soils can be used for intensive cropping; that is, row crops can be grown frequently in relation to hay and small grains. These soils respond well to fertilizer and give high yields of feed and forage. The poorer soils generally are steep, sandy, or wet. For these soils, choose a cropping system that will fit the limitations of the soils and that will protect them from damage. Suitable cropping systems are discussed under the capability units.

Control erosion.—Practices to control erosion are needed on all of the soils in the county. They are especially needed on steep or sandy soils. Contour stripcropping, terracing, and use of diversions are the practices most generally used.

Contour stripcropping and terracing, designed and used correctly, greatly reduce the loss of soil by erosion. For contour stripcropping to be the most effective, a cropping system is needed in which hay crops are grown in strips alternating with corn or a small grain (fig. 22). If a hay crop is grown in the alternate strips, the runoff from the strips of corn or small grain spread out and the velocity of the water is slowed down; thus, most of the soil carried by the water settles out in the strips.

On long slopes the use of contour strips is limited. Much runoff from the upper part of the long slopes flows across the lower part of the slope and is likely to cause erosion, even if strips of hay are alternated with strips of corn or grain. On long slopes terraces or diversions are needed to intercept the runoff and carry it safely from the field. Terraces and diversions both intercept runoff, but a well-constructed terrace can be farmed. Diversions, on the other hand, are larger, more permanent, and divide the field.

Terraces are generally not satisfactory on slopes of more than 12 percent, but diversions can be constructed on slopes of as much as 25 percent. Terraces and diversions both require maintenance to keep the channels open and in good operating condition.

Provide adequate drainage.—Most of the soils on uplands in Crawford County are naturally well drained. Many of the soils of the bottom lands and terraces, however, require supplementary drainage. Draining a wet soil will make it more favorable for the growth of higher plants and soil organisms, and it will thus improve the structure of the soil. Furthermore, damage to the roots of plants, particularly of alfalfa and sweetclover by alternate freezing and thawing, is reduced. The water table is also lowered, making the depth in which plant nutrients are available greater. In addition, the soil warms earlier in spring if excess water is drained away because evaporation at the surface is reduced and less heat is needed to warm the soil. Soils that are inadequately drained are likely to be from 5 to 15 degrees cooler in spring than well-drained soils (*5*).

Management by Capability Units

Soils in one capability unit have about the same limitations and similar risks of damage. The soils in one unit, therefore, need about the same kind of management, though they may have formed from different kinds of parent material and in different ways. The capability units are described in the following pages. The soils in each unit are listed, and management suitable for all the soils of one unit is suggested.

CAPABILITY UNIT I-1

The soils in this unit are deep, well drained to moderately well drained, and nearly level. They are moderately permeable and have moderate to high moisture-holding capacity. The surface layers are friable and silty, and the subsoils are firm and have a texture of silt loam to silty clay loam. The soils are easy to manage and conserve, and good tilth is easy to maintain. The following soils are in this unit:

Bertrand silt loam, 0 to 2 percent slopes.
Jackson silt loam, 0 to 2 percent slopes.
Richwood silt loam, 0 to 2 percent slopes.
Toddville silt loam, 0 to 2 percent slopes.

If fertility is kept high, these soils can be used intensively for corn, small grains, forage crops, and peas, potatoes, tobacco, and other special crops. The soils are also suited to trees and to use for providing food and cover for wildlife.

Suitable cropping systems for these soils are:

2 years of row crops followed by 1 year each of a small grain and hay.
2 years of row crops followed by 1 year of a small grain and then by 2 years of hay.
1 year each of a row crop and a small grain followed by 2 years of hay.

Continuous row crops with a cover crop of rye, or continuous row crops with stover left on the field. If row crops are grown continuously, use minimum tillage, chemical control of weeds, and a program to keep fertility high.

If a high level of production is to be maintained, the nutrients that have been removed by crops must be replaced, as well as those that have been lost through erosion or leaching. This can be done by applying barnyard manure and commercial fertilizer. The fertilizer should be added in the kinds and amounts indicated by soil tests.

Lime should be applied according to the pH of the soil, the type of liming material to be used, and the crop to be grown. For legumes, it is best to apply lime before a row crop is seeded and 1 or more years before the legume is seeded.

CAPABILITY UNIT IIe-1

In this capability unit are deep, well drained to moderately well drained, gently sloping soils that have friable subsoils. The soils have moderate to high moisture-holding capacity and are moderately permeable. Good tilth is fairly easy to maintain. The following soils are in this unit:

- Bertrand silt loam, 2 to 6 percent slopes.
- Bertrand silt loam, 2 to 6 percent slopes, moderately eroded.
- Downs silt loam, 2 to 6 percent slopes.
- Downs silt loam, 2 to 6 percent slopes, moderately eroded.
- Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded.
- Fayette silt loam, uplands, 2 to 6 percent slopes.
- Fayette silt loam, uplands, 2 to 6 percent slopes, moderately eroded.
- Fayette silt loam, valleys, 2 to 6 percent slopes.
- Jackson silt loam, 2 to 6 percent slopes.
- Jackson silt loam, 2 to 6 percent slopes, moderately eroded.
- Lindstrom silt loam, 2 to 6 percent slopes.
- Richwood silt loam, 2 to 6 percent slopes.
- Seaton silt loam, 2 to 6 percent slopes, moderately eroded.
- Toddville silt loam, 2 to 6 percent slopes.

These soils are used mostly to grow corn, small grains, grasses, and legumes, and for peas, potatoes, tobacco, and other special crops. They are well suited to these crops. A few of the areas are also used for permanent pasture, as woodland, or to provide food and cover for wildlife.

If row crops are grown on these soils, care is required to prevent erosion. Tilling on the contour, growing cover crops, and using terraces on long, regular slopes will help to control erosion and permit more intensive cropping. Runoff from adjacent higher areas can be diverted by constructing diversion terraces. Grassed waterways, if they are properly designed, can be used to remove excess water safely and will help to prevent gullying.

Using a cropping system that includes several years of meadow crops will also help to reduce erosion. If conservation practices are not used, the cropping system can safely allow only one row crop in 4 years. If tillage is done on the contour, however, row crops and small grains can be grown more frequently; and if stripcropping or terracing is used, row crops can be grown 2 years out of 3. Additional row crops can be grown in the cropping system if large amounts of crop residue are added, or if winter cover crops are grown and contour tillage is used. Growing hybrid corn that is heavily fertilized to get high yields will produce large amounts of residue. The cornstalks can be shredded and spread over the soil to provide protection from erosion during winter and spring.

Suggested conservation practices and cropping systems are:

Contour stripcropping: 1 year each of a row crop and small grain followed by 2 years of hay.

Terracing: 3 years of row crops followed by 1 year of a small grain and then by 2 years of hay; or 4 years of row crops followed by 1 year of a small grain with sweetclover plowed under in spring.

Terracing plus wheel-track planting: 5 years of row crops followed by 1 year of a small grain and then by 2 years of hay.

If special conservation practices are not used, a suitable cropping system is:

1 year each of a row crop and small grain and then 2 years of hay.

CAPABILITY UNIT IIe-2

In this capability unit are moderately deep, well-drained, gently sloping upland soils that are underlain by sand or clay over bedrock. These soils have silty surface layers and slightly finer textured subsoils. They are slightly droughty and are likely to erode unless protected. The following soils are in this unit:

- Dubuque silt loam, 2 to 6 percent slopes, moderately eroded.
- Gale silt loam, 2 to 6 percent slopes, moderately eroded.

The soils of this unit are used principally for growing corn, small grains, grasses, and legumes. A few areas are used for permanent pasture, as woodland, or for wildlife.

If these soils are used for cultivated crops, practices are required to control erosion. If the slopes are long, terraces or diversions should be used. A higher proportion of cultivated crops can be used in the cropping system if intensive practices are used to control erosion than if such practices are not used. Yields are moderately high if the soils are well managed.

Suggested conservation practices and cropping systems are:

Contour stripcropping: 1 year each of a row crop and small grain followed by 2 or 3 years of hay.

Terracing: 2 years of row crops followed by 1 year of a small grain and then by 2 years of hay.

If special conservation practices are not used, a suitable cropping system is:

1 year each of a row crop and small grain and then 3 years of hay. This cropping system is not suitable, however, if the slopes are more than 200 feet long.

If a high level of production is to be maintained, the nutrients that have been removed by crops must be replaced, as well as those that have been lost through erosion or leaching. This can be done by applying barnyard manure and commercial fertilizer. The fertilizer should be added in the kinds and amounts indicated by soil tests.

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Lime should be applied according to the pH of the soil, the type of liming material to be used, and the crop to be grown. For legumes, lime is best applied before a row crop is seeded and 1 or more years before the legume is seeded.

CAPABILITY UNIT IIe-6a

Only one soil—Medary silt loam, 0 to 2 percent slopes—is in this unit. This is a moderately well drained, nearly level soil that is underlain by somewhat slowly permeable red clay.

Corn, small grains, and hay are grown on this soil, but the soil could also be used for permanent pasture, as woodland, or for wildlife. Because of its somewhat slowly permeable subsoil and substratum, the soil is slow to warm in spring. Consequently, yields are lower than on soils that are naturally well drained.

Movement of water down through this soil is somewhat slow because of the clayey subsoil. Therefore, after a heavy rain, water is likely to pond on flat areas and in slight depressions. Surface drains and grassed waterways can be used in combination to dispose of the excess water. Adding large amounts of barnyard manure and turning under green manure and crop residues will make the soil loose and porous and will help it to dry more rapidly. Growing alfalfa or other deep-rooted crops will also help to improve the soil. Diversion terraces can be constructed along the upper edges of the fields to prevent water from adjoining slopes from running onto the soil.

A suitable cropping system is:

1 year each of a row crop and small grain followed by 2 years of hay.

CAPABILITY UNIT IIe-6b

Only one soil—Medary silt loam, 2 to 6 percent slopes—is in this unit. This soil is moderately well drained and gently sloping. It is underlain by somewhat slowly permeable, red clay.

This soil is used to grow corn, small grains, and hay, but it could also be used for permanent pasture, as woodland, or for wildlife. Because of its somewhat slowly permeable subsoil and substratum, it is slow to warm in spring. Consequently, yields are lower than on soils that are naturally well drained.

The movement of water down through this soil is somewhat slow because of the clayey subsoil. Therefore, tile drains are not adequate to remove the surplus water, but surface drains can be used. Diversion terraces can be constructed along the upper edges of fields to prevent erosion by runoff from adjoining hillsides.

If the surface layer of this soil is lost through erosion, plowing will then be in the clayey subsoil, which is difficult to till. Adding large amounts of barnyard manure and turning under green manure and crop residues will make the soil loose and porous and help it dry more rapidly. Growing alfalfa or other deep-rooted legumes will also improve the soil.

Suggested conservation practices and cropping systems are:

Contour stripcropping: 2 years of row crops followed by 1 year each of a small grain and hay.

Terracing: 3 years of row crops followed by 1 year each of a small grain and hay.

If contour stripcropping and terracing are not used, a suitable cropping system is:

1 year each of a row crop and a small grain followed by 4 years of hay.

CAPABILITY UNIT IIs-1a

In this unit are moderately deep, well-drained, nearly level soils that are underlain by loose sand. These soils are on high benches along the major streams. They are slightly droughty, but they are moderately fertile if well managed. The following soils are in this unit:

Dakota loam, 0 to 3 percent slopes.
Meridian loam, 0 to 2 percent slopes.
Tell silt loam, 0 to 2 percent slopes.
Waukegan loam.

These soils are suited to corn, small grains, grasses, and legumes. They are also suitable for trees and for use as wildlife areas. The loamy surface soil makes a good seedbed if the content of organic matter is kept high. The organic matter will improve the structure, thus permitting moisture to enter the surface soil readily. Because the soils are underlain by loose sand and gravel, it is particularly important to conserve moisture. Wind stripcropping or shelterbelts may be needed where these soils occur adjacent to areas of sandy soils.

Suggested cropping systems are:

2 years of row crops, 1 year of a small grain, and 2 years of hay.
2 years of row crops followed by 1 year each of a small grain and hay.
Continuous row crops with a cover crop of rye, or continuous row crops with stover left on the field. If row crops are grown continuously, use minimum tillage. Also, use chemicals to control weeds and a program to keep fertility high.
1 year each of a row crop and small grain followed by 2 years of hay.

CAPABILITY UNIT IIs-1b

In this unit are moderately deep, well-drained, gently sloping soils that are underlain by loose sand. These soils are on benches along the major streams. They are slightly droughty but are moderately fertile if well managed. The following soils are in this unit:

Meridian loam, 2 to 6 percent slopes.
Tell silt loam, 2 to 6 percent slopes, moderately eroded.

These soils are suited to corn, small grains, grasses, and legumes. They are also suited to trees or can be used as wildlife areas. The loamy surface soil makes a good seedbed if the content of organic matter is kept high. The organic matter will improve the structure, thus permitting moisture to enter the soil readily. Because the soils are underlain by loose sand, it is particularly important to conserve moisture.

If maximum yields are to be obtained, the use of suitable conservation practices and cropping systems is required.

Suggested conservation practices and cropping systems are:

Contour stripcropping: 1 year each of a row crop and small grain and then 2 years of hay.
Terracing: 2 years of row crops, 1 year of a small grain, and 2 years of hay.
Terracing plus wheel-track planting: 3 years of row crops, 1 year of a small grain with sweetclover plowed under in spring; or 4 years of row crops followed by 1 year each of a small grain and hay.

If special conservation practices are not used, a suitable cropping system is:

1 year each of a row crop and small grain followed by 3 years of hay.

CAPABILITY UNIT IIw-1a

This unit consists of deep, poorly drained or somewhat poorly drained, silty soils that are nearly level. The soils are in depressions along streams on high bottoms or are on low benches. Most of the areas are nearly level, but some are gently sloping. The soils are underlain by fine-textured material that breaks into small, angular blocks when it dries. Water moves readily downward through the cracks between the blocks. The following soils are in this unit:

Ettrick silt loam.
Rowley silt loam, 0 to 2 percent slopes.

If adequately drained, these soils are well suited to corn and small grains and to the grasses and legumes that grow well in this area. Yields are moderately high. Alfalfa can be grown if the soils are adequately drained, but alsike or ladino clover can be grown instead of the alfalfa.

Drainage can be provided by tile lines if suitable outlets are available. Diversion terraces can be used to protect the soils from runoff from adjoining higher areas. In some places surface ditches alone will provide adequate drainage. In other places tile drains, in combination with surface ditches and diversion terraces, are needed to provide drainage.

If tile drains are used, good structure must be maintained in the surface layer so that excess moisture can enter the soil and move downward to the tile. Growing grasses and legumes, adding barnyard manure or green manure, and working the soil only when it is dry enough to prevent puddling will help improve the structure.

Suitable cropping systems are:

3 years of row crops followed by 1 year of a small grain and then by 2 years of hay.
2 years of row crops followed by 1 year each of a small grain and hay.
1 year each of a row crop, small grain, and hay.

On the gently sloping areas, use contour stripcropping or terracing. If necessary, use both practices.

If a high level of production is to be maintained, the nutrients that have been removed by crops and those that have been lost by erosion or leaching must be replaced. This can be done by applying barnyard manure and commercial fertilizer. The fertilizer should be added in the kinds and amounts indicated by soil tests.

Lime should be applied according to the pH of the soil, the type of liming material to be used, and the crop to be grown. For legumes, lime is best applied before a row crop is seeded and 1 or more years before the legume is seeded.

CAPABILITY UNIT IIw-1b

Only one soil—Rowley silt loam, 2 to 6 percent slopes—is in this unit. This soil is deep, silty, somewhat poorly drained, and gently sloping. It is on terraces in areas that surround depressions or in the necks of draws that lead away from the terraces. The soil is underlain by fine-textured material that breaks into small, angular blocks when dry; water moves readily downward through the cracks between the blocks. The permeability of the soil is moderate to moderately slow, and the moisture-supplying capacity is high.

If drainage is adequate and practices have been applied to prevent erosion, this soil is well suited to corn, small grains, and grasses and legumes. Yields are moderately high. Alfalfa can be grown if the soil is adequately drained, but alsike or ladino clover can be grown instead of the alfalfa. The soil is also suitable for growing a limited number of trees or for wildlife areas.

This soil is subject to erosion caused by runoff from adjoining areas, but it can be protected by using diversion terraces. On the level areas tile drains are needed to remove excess surface water, but on the gently sloping areas a system of diversion terraces is generally sufficient to carry away the excess water. The diversion terraces remove the water from the higher areas to grassed waterways and shallow ditches and intercept subsurface seepage water.

Suggested cropping systems and conservation practices for this soil are:

Diversion terracing: 1 year each of a row crop, small grain, and hay; or 2 years of row crops followed by 1 year each of a small grain and hay.

If conservation practices are not used, a suitable cropping system is:

1 year each of a row crop and small grain followed by 3 years of hay.

CAPABILITY UNIT IIw-11

This unit consists of deep, well drained to moderately well drained, silty soils that are nearly level to gently sloping and are subject to occasional flooding. These soils are mostly in narrow valleys and on fan-shaped areas at the mouths of the valleys, but some areas are on wider flood plains. They are moderately permeable and have moderate to high moisture-supplying capacity. The following soils are in this unit:

Arenzville silt loam.
Chaseburg silt loam, 0 to 6 percent slopes.
Judson cherty silt loam, 2 to 6 percent slopes.
Judson silt loam, 0 to 6 percent slopes.

If they are adequately protected from excess flooding, these soils are well suited to corn, tobacco, small grains, and legumes. Areas that are inaccessible or that are flooded frequently are best suited to permanent pasture, to trees, or to use as wildlife areas. Flooding is more severe in some areas than in others, and, therefore, the need for protection from flooding varies.

If good yields are to be obtained, most areas of these soils will need to be protected by dikes to keep them from being flooded by streams. They also need diversion

terraces in many places to protect them from runoff from the higher lying areas. Sloping, shaping, and seeding the natural waterways will help to reduce flooding.

In protected areas a suitable cropping system consists of growing a row crop 1 year, followed by 1 year each of a small grain and hay. On the nearly level soils, row crops can be grown continuously if the level of fertility is kept high and the content of organic matter and good tilth are maintained. If row crops are grown continuously, plow under plant residues or green-manure crops and add large amounts of barnyard manure.

CAPABILITY UNIT IIIe-1

This unit consists of deep, silty, sloping soils that are well drained. The soils are moderately permeable and are high in moisture-supplying capacity. The following soils are in this unit:

- Bertrand silt loam, 6 to 12 percent slopes, moderately eroded.
- Downs silt loam, 6 to 12 percent slopes, moderately eroded.
- Dubuque silt loam, deep, 6 to 12 percent slopes.
- Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded.
- Fayette silt loam, uplands, 6 to 12 percent slopes.
- Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded.
- Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded.
- Lindstrom silt loam, 6 to 12 percent slopes.
- Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded.
- Richwood silt loam, 6 to 12 percent slopes.
- Seaton silt loam, 6 to 12 percent slopes, moderately eroded.

These soils are well suited to corn, tobacco, small grains, grasses, and legumes. They are also suited to trees and to use as wildlife areas.

The soils require protection from runoff. Using suitable cropping systems, adding barnyard manure, plowing under green manure, and returning the residues of crops to the fields will help to keep the soil in good tilth. If the soil has good tilth, moisture will soak into the ground readily. Growing the crops in contour strips with alternate strips of hay will slow the runoff. If terraces are properly installed, they will divert runoff away from the fields and will help to prevent serious erosion.

Suggested cropping systems and conservation practices on slopes of 8 percent that average 200 feet in length are:

Contour stripcropping: 1 year each of a row crop and small grain and then 2 years of hay.

Terracing: 2 years of row crops followed by 1 year each of a small grain and hay.

Terracing and leaving 2 tons or more of residue from previous crops on the field, using a field cultivator instead of a plow, and leaving the residue on the surface until planting, then plow planting: 2 years of row crops followed by 1 year of a small grain with sweetclover plowed under in spring.

If contour stripcropping or terracing is not used, suggested cropping systems are:

1 year of a small grain and 2 years of hay; or 1 year each of a row crop and small grain followed by 3 years of hay.

CAPABILITY UNIT IIIe-2

This unit consists of shallow to moderately deep, well-drained, sloping soils that are underlain by loose sand, gravel, or bedrock. The bedrock consists of sandstone or limestone. The following soils are in this unit:

- Dubuque silt loam, 6 to 12 percent slopes, moderately eroded.
- Gale silt loam, 6 to 12 percent slopes, moderately eroded.
- Hixton loam, 6 to 12 percent slopes, moderately eroded.
- Meridian loam, 6 to 12 percent slopes, moderately eroded.
- Tell silt loam, 6 to 12 percent slopes, moderately eroded.

These soils are used principally for corn, small grains, grasses, legumes and other crops commonly grown in the area. They are also suitable for permanent pasture, or for use as woodland, or for wildlife.

On these soils the hazard of erosion is severe. Because of the kind of underlying material, little moisture is available for plants during dry spells. Practices are required to prevent accelerated erosion and to improve tilth so that the soil can store the needed moisture. Using a suitable cropping system will help improve the structure of the soil and, thus, will encourage the rapid infiltration of moisture.

Suggested cropping systems and conservation practices are:

Contour stripcropping: 1 year each of a row crop and small grain and then 3 years of hay; or 1 year of a small grain and 2 years of hay.

Terracing: 1 year each of a row crop and small grain and 2 years of hay. Terracing is not practiced on some areas of the Dubuque soil because bedrock is too near the surface.

If contour stripcropping or terracing is not used, a suggested cropping system is:

1 year of a small grain and 3 years of hay.

CAPABILITY UNIT IIIe-6

Only one soil—Medary silt loam, 6 to 12 percent slopes, moderately eroded—is in this unit. This moderately deep, moderately well drained, sloping soil is underlain by slowly permeable material. The surface layer is grayish-brown silt loam, and the substratum is reddish clay. The soil occurs along the edges of stream terraces in the lower ends of the larger valleys.

If this soil has been adequately drained, it is used for corn, small grains, and hay. It can also be used for permanent pasture, as woodland, and as wildlife areas.

Because of the clayey subsoil, little water moves downward through this soil. The slopes are generally not long, but in places large quantities of water from adjacent fields runs onto the areas. In these places diversion terraces should be built along the upper edges of the areas to conduct the water to grassed waterways.

Applying large amounts of barnyard manure and turning under green manure and the residues of crops will help to keep the soil in good tilth. These practices will make the soil more loose and porous and will help it to dry more rapidly. If the field is too wet for alfalfa, alsike, ladino clover, or other legumes that will withstand wetness can be planted, along with redtop, timothy, or other grasses.

Because of its slowly permeable subsoil and substratum, this soil is slow to warm in spring. Therefore, yields of crops will be lower than on soils that are naturally well drained.

Suggested cropping systems and conservation practices are:

- Contour stripcropping: 1 year each of a row crop and small grain and 3 years of hay.
- Diversion terraces: 1 year each of a row crop, small grain, and hay.

If contour stripcropping and terracing are not used, a suggested cropping system is:

- 1 year of a small grain followed by 3 years of hay.

CAPABILITY UNIT IIIe-11

The soils in this capability unit are deep and sloping and are moderately well drained to well drained. They occur in narrow draws, in some of the larger valleys, and at the mouths of small side valleys. The soils are flooded frequently. They are subject to scouring and receive deposits of silt, sand, and cobblestones carried by the floodwaters of streams. The following soils are in this unit:

Chaseburg silt loam, 6 to 12 percent slopes.
Judson cherty silt loam, 6 to 12 percent slopes.

Because of the severe hazard of flooding, these soils are used mostly for permanent pasture. If dikes are installed to divert floodwaters and are well maintained, the soils can be cropped successfully. Only if the soils are protected can moderately high yields be obtained of the crops commonly grown in the county. Crops respond well to applications of barnyard manure and commercial fertilizer.

If the soils are protected from flooding, suggested cropping systems and conservation practices are:

- Contour stripcropping: 1 year each of a row crop and small grain and then 2 years of hay.

If contour stripcropping or terracing is not used, suggested cropping systems are:

- 1 year of a small grain and 2 years of hay.
- 1 year each of a row crop and small grain and then 3 years of hay.

CAPABILITY UNT IIIs-2

This unit consists of moderately deep, well-drained soils that are underlain by sandstone or by loose sand and gravel. The soils are nearly level to gently sloping. They are moderately droughty. If they are cultivated intensively, they are likely to be eroded by wind or water. The following soils are in this unit:

Dakota sandy loam, 0 to 3 percent slopes.
Hixton sandy loam, 2 to 6 percent slopes.
Meridian sandy loam, 0 to 2 percent slopes.
Meridian sandy loam, 2 to 6 percent slopes.
Meridian sandy loam, 2 to 6 percent slopes, moderately eroded.

These soils are suited to all of the cultivated crops commonly grown in the county. They are also suited to pasture and trees and can be used as wildlife areas.

Keeping the surface of the soils rough or using crop residues as a mulch prevents the soils from blowing and permits them to store the maximum amount of moisture. The soils are less likely to blow if crop residues and green-manure crops are turned under and large amounts of barnyard manure are added. Shelterbelts, if located in suitable places, will also help to prevent damage by wind. The more strongly sloping soils need organic matter added more frequently than the less sloping soils. Furthermore, contour stripcropping, terracing, use of diversion ditches, and other supporting conservation practices are necessary on the soils that have stronger slopes. In addition, the soils will need adequate amounts of fertilizer and a cropping system that includes meadow crops.

During periods of low rainfall, crops on these soils respond well to supplemental irrigation. If the soils are irrigated, they require larger amounts of fertilizer than the amounts generally used.

For soils that have slopes of less than 2 percent, suggested conservation practices and cropping systems are:

- Wind stripcropping: 2 years of row crops and 1 year each of a small grain and hay.
- Continuous row crops with a cover crop of rye, or continuous row crops with all crop residues left on the field. If row crops are grown continuously, use minimum tillage. Also, keep fertility high, protect the surface from wind erosion, and use chemicals to control weeds.

If wind stripcropping is not used, a suggested cropping system is:

- 1 year of a small grain and 2 years of hay.

For soils that have slopes of 2 to 6 percent, suggested conservation practices and cropping systems are:

- Contour stripcropping: 2 years of row crops, 1 year of a small grain, and 2 years of hay; or 1 year each of a row crop and small grain, and then 2 years of hay.
- Terracing: 1 year each of a row crop, small grain, and hay; or 2 years of row crops followed by 1 year each of a small grain and hay.

If contour stripcropping or terracing is not used, suggested cropping systems are:

- 1 year of a small grain and 2 years of hay.
- 1 year each of a row crop and small grain and 3 years of hay.

CAPABILITY UNIT IIIw-14

This capability unit is made up of moderately well drained to somewhat poorly drained, nearly level soils that are subject to flooding. The soils are silty or consist of mixed alluvial silt and sand. They are on bottom lands and lie close to streams. The following soils are in this unit:

Alluvial land.
Orion silt loam.

Because the soils are slow to warm in spring and are subject to flooding, they are not so well suited to crops as other soils in the county. Alfalfa will not grow well unless the soils are adequately drained, but alsike and ladino clover can be grown instead of the alfalfa.

These soils should not be cultivated unless they are protected from floodwaters. In small areas that have been cultivated, scouring, caused by floods, has removed 1½ to 2 feet of the surface layer and left hummocks between the eroded areas. In other places floodwaters have deposited sand, silt, gravel, chert, and similar materials on the soils. Using dikes and ditches to hold back the

floodwaters will help to reduce damage by scouring. Areas that require drainage can be drained by shallow ditches.

If the soils are protected from flooding, they can be cropped fairly intensively. To maintain good tilth, the soils ought to be kept in hay 1 year out of 3 and large amounts of barnyard manure should be applied.

CAPABILITY UNIT IVe-1

This unit consists of deep, well-drained, silty soils that are sloping to moderately steep. The soils are moderate in moisture-supplying capacity and are moderate to high in natural fertility. Because of their strong slopes, they are subject to severe erosion and resultant losses of plant nutrients if they are not protected. The following soils are in this unit:

- Downs silt loam, 12 to 20 percent slopes, moderately eroded.
- Dubuque silt loam, deep, 12 to 20 percent slopes.
- Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded.
- Fayette silt loam, uplands, 6 to 12 percent slopes, severely eroded.
- Fayette silt loam, uplands, 12 to 20 percent slopes.
- Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded.
- Fayette silt loam, valleys, 12 to 20 percent slopes.
- Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded.
- Lindstrom silt loam, 12 to 20 percent slopes.
- Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded.
- Seaton silt loam, 12 to 20 percent slopes, moderately eroded.

These soils are suited to corn, small grains, and hay. They are also suitable for trees and for use as wildlife areas.

These soils require careful management to maintain an adequate supply of plant nutrients. Crops respond well if lime and a complete fertilizer are added. Growing tilled crops in contour strips with alternate strips of hay will help to control erosion. Diversion terraces can also be used to protect the soils, especially on long slopes. They will also protect tilled fields from runoff from higher lying pastures that have been overgrazed.

Planting close-growing crops will help to prevent erosion. Applying lime and a complete fertilizer will help to maintain high yields and will also provide further protection from erosion. If the soils are used for tilled crops, the crops should be planted in contour strips by the wheel-track method. The content of organic matter and the supply of plant nutrients needs to be kept high.

Suggested cropping systems and conservation practices for soils that have slopes of less than 12 percent are:

- Contour stripcropping: 1 year each of a row crop and small grain and 3 years of hay.
- Contour stripcropping and wheel-track planting: 1 year each of a row crop and small grain and 2 years of hay.
- Terracing: 1 year each of a row crop and small grain and 2 years of hay; diversion terraces can be used instead of regular field terraces.

Suggested cropping systems and conservation practices for soils that have slopes of more than 12 percent are:

- Contour stripcropping: 1 year each of a row crop and small grain and 4 years of hay.
- Contour stripcropping and wheel-track planting: 1 year of a row crop, planted in the wheel tracks of the tractor and interseeded with alfalfa when the crop is cultivated the last time, followed by 3 years of hay.

If no conservation practices are used, these soils should be kept in a rotation consisting of a small grain and hay.

CAPABILITY UNIT IVe-2

This unit consists of moderately deep, well-drained, silty soils that are underlain by sand or red clay over bedrock or deep sand. The soils are sloping to moderately steep. Because they are fairly shallow, they store only a limited amount of moisture. Runoff is likely to cause erosion and permanent damage. The following soils are in this unit:

- Dubuque silt loam, 12 to 20 percent slopes.
- Dubuque silt loam, 12 to 20 percent slopes, moderately eroded.
- Dubuque soils, 6 to 12 percent slopes, severely eroded.
- Gale silt loam, 12 to 20 percent slopes.
- Gale silt loam, 12 to 20 percent slopes, moderately eroded.
- Hesch loam, 12 to 20 percent slopes.
- Hixton loam, 12 to 20 percent slopes.
- Hixton loam, 12 to 20 percent slopes, moderately eroded.
- Tell silt loam, 12 to 20 percent slopes, moderately eroded.

These soils can be used for growing corn, small grains, grasses, and legumes if necessary, but they are best kept in hay or pasture most of the time. They are also suitable for trees and for use as wildlife areas.

Crops grown on these soils are likely to be damaged by lack of moisture. Practices are, therefore, needed to slow down runoff and to encourage moisture to soak into the soil. If the soils are cultivated, the crops should be planted in contour strips with alternating strips of hay. Corn should be planted in the wheel tracks of the tractor and ought to be interseeded after it has been cultivated for the last time. Using diversion terraces will also help to control runoff.

If conservation practices are used, suggested cropping systems on slopes of less than 15 percent and about 200 feet in length are:

- Contour stripcropping: 1 year each of a row crop and small grain and 4 years of hay.
- Contour stripcropping, leaving 2 tons per acre of residue from the previous crop on the field and using a field cultivator instead of plowing, and then plow planting: 1 year each of a row crop and small grain and 2 years of hay.
- Terracing: 1 year each of a row crop and small grain and 2 years of hay. On some areas of the Dubuque soils, terracing is not practiced because bedrock is too near the surface.
- Terracing, leaving 2 tons per acre of residue from the previous crop on the field and using a field cultivator instead of a plow, and then plow planting: 2 years of row crops followed by 1 year of a small grain and 2 years of hay.

If no conservation practices are used, a cropping system that consists of small grain and hay crops should be used.

Suggested cropping systems and conservation practices on slopes of 15 percent or more and about 200 feet in length are:

- Contour stripcropping: A cropping system consisting of a small grain and hay.

Contour stripcropping, leaving 2 tons per acre of residue from the previous crop on the field and using a field cultivator instead of a plow and plow planting: 1 year each of a row crop and small grain and 4 years of hay.

CAPABILITY UNIT IVe-3

The soils in this unit are moderately deep, well-drained sandy loams that are underlain by sandstone or by loose sand and gravel. These soils have strong slopes and are moderately droughty. If they are cultivated intensively, they are subject to wind erosion. The following soils are in this unit:

Hixton sandy loam, 6 to 12 percent slopes, moderately eroded.
Meridian sandy loam, 6 to 12 percent slopes, moderately eroded.

These soils are suited to all of the cultivated crops commonly grown in the county. They are also suited to pasture and trees, and they can be used as wildlife areas.

Keeping the surface rough or keeping a mulch of crop residues on the surface will help to prevent the soils from blowing and will permit the maximum storage of moisture. The soils are less likely to blow if crop residues and green-manure crops are turned under and large amounts of barnyard manure are added. Contour stripcropping, terracing, and using diversion ditches and other supporting conservation practices are also necessary on these soils. In addition, adequate amounts of fertilizer will be needed, and the cropping system should include meadow crops.

Suggested conservation practices and cropping systems are:

Contour stripcropping: 1 year each of a row crop and small grain followed by 2 years of hay.
Terracing: 1 year each of a row crop, small grain, and hay.

If contour stripcropping and terracing are not used, the cropping system should consist of a rotation of a small grain and hay.

CAPABILITY UNIT IVe-5

Only one soil—Dubuque cherty silt loam, 6 to 12 percent slopes—is in this mapping unit. It is a somewhat shallow, well-drained soil that contains scattered fragments of chert. The soil is sloping and is on uplands. Bedrock generally is at a depth of 1 to 2 feet. The moisture-holding capacity is moderately low, and the soil is droughty, particularly during extended dry periods. If it is eroded, the soil will become even more droughty.

This soil is best suited to small grains, hay, and permanent pasture. It is also suitable as woodland and as wildlife areas. Legumes and grasses are probably the best crops to grow on this soil; row crops should be grown only to a limited extent.

Because of the shallow depth to bedrock, terraces are difficult to construct on this soil. Outcrops of bedrock occur in places, and in these areas the soil is difficult to farm in contour strips. If the small areas of rock outcrops are fenced in and planted to trees, shrubs, and other plants, they can be used to provide food and cover for wildlife.

Suitable cropping systems and conservation practices are:

In areas where contour stripcropping is feasible: 1 year each of a row crop and small grain followed by 3 years of hay.
In areas where contour stripcropping is impractical, rotate small grains and hay on this soil.

CAPABILITY UNIT IVe-7

This unit is made up of moderately deep, well-drained soils that are underlain by medium-textured material. The underlying material is silt or consists of layers made up of fine-grained sandstone, siltstone, and shale. The soils are moderately steep and are on the sides of valleys.

The following soils are in this unit:

Norden fine sandy loam, 12 to 20 percent slopes.
Norden fine sandy loam and loam, 12 to 20 percent slopes, moderately eroded.

These soils are suited to corn, small grains, grasses, and legumes. They are also suited to trees and to use as wildlife areas.

Because of the coarse texture of the surface soil and the strong slopes, a good supply of organic matter must be maintained in these soils. Adding organic matter will help to make the soils porous so that moisture can penetrate readily. As a result, runoff and erosion will be reduced. Using a cropping system in which the soils are kept in hay most of the time will add much organic matter. Corn can be grown if it is planted by the wheel-track method. Also, alfalfa needs to be interseeded with the corn to help reduce runoff. Cultivated crops should be planted in contour strips with alternate strips of hay. In areas where the slopes are long, diversions should be built to carry the runoff water away from the fields to a sod waterway.

Suggested conservation practices and cropping systems are:

Contour stripcropping: 1 year of a row crop planted in the wheel tracks of the tractor and alfalfa interseeded when the row crop is cultivated for the last time; this should be followed by 3 years of hay.

If contour stripcropping is not used, a suggested cropping system is:

1 year of a small grain followed by 3 or more years of hay. Renovate when ready to reseed.

CAPABILITY UNIT IVs-3

This unit consists of deep, somewhat excessively drained, sandy soils that are subject to rapid leaching. The soils are nearly level to gently sloping and are on benches. Some of these soils have bands of slightly finer textured material in the subsoil. All of the soils dry rapidly. If they are cultivated and are not protected, they are subject to wind erosion. The following soils are in this unit:

Gotham loamy fine sand, 2 to 6 percent slopes.
Gotham loamy fine sand, 2 to 6 percent slopes, eroded.
Sparta loamy fine sand, 0 to 2 percent slopes.
Sparta loamy fine sand, 2 to 6 percent slopes.
Sparta loamy fine sand, 2 to 6 percent slopes, eroded.

These soils can be used to grow corn, small grains, and hay. They are also suited to permanent pasture, to trees, and to use as wildlife areas.

Moisture and plant nutrients move downward readily through these soils and out of reach of plant roots. Consequently, the soils require regular applications of fertilizer. The nearly level areas need shelterbelts and should be stripcropped.

Corn and small grains grown on these soils generally respond to applications of complete fertilizer. Applications of a fertilizer that contains a high proportion of potash and some boron may be used each year to topdress legume-grass mixtures used in hayfields. Permanent bluegrass pastures can also be made more resistant to erosion by applying fertilizer. In the pastured areas adequate fertilization and protection from overgrazing are necessary from about August 15 to September 30 to permit the plants to keep enough roots in reserve for overwintering.

Adding large amounts of barnyard manure, returning crop residues to the fields, and plowing under green-manure crops will add organic matter to the soils. The organic matter improves the tilth of the soils, aids in controlling wind erosion, and increases the moisture-holding capacity.

Suggested conservation practices and cropping systems are:

Contour stripcropping or wind stripcropping: 1 year each of corn and a small grain and 2 years of hay.

If contour stripcropping or wind stripcropping is not used, a suitable cropping system consists of 1 year of a small grain followed by 2 years of hay.

To maintain a high level of production, nutrients that have been removed by crops and those that have been lost through erosion or leaching must be replaced. This can be done by applying barnyard manure and commercial fertilizer. The fertilizer should be added in the kinds and amounts determined by soil tests.

Lime should be applied according to the pH of the soil, the type of liming material to be used, and the crop to be grown. For legumes, lime is best applied before a row crop is seeded and 1 or more years before the legume is seeded.

CAPABILITY UNIT Vw-15

This unit consists of poorly drained, nearly level, mixed silty, sandy, or gravelly soils that are subject to frequent overflow. The soils are on alluvial flood plains. In the areas on the flood plains of the Mississippi and Wisconsin Rivers the soils are made up mainly of coarse sand and gravel and are low in fertility. In the areas on the flood plains of tributary streams, however, they consist largely of silty materials. In all of the areas, the water table is permanently high. The following soils are in this unit:

Alluvial land, poorly drained.
Orion silt loam, poorly drained variant.

Protecting these areas from overflow or providing adequate drainage so that crops can be grown is generally not economical. The soils are best suited to pasture or trees. Some areas that are pastured can be protected from overflow and can then be fertilized and renovated.

The areas of woodland require protection from fire and from grazing. Replanting desirable kinds of trees is restricted; therefore, desirable species should be encouraged by selective cutting. Suggestions for replanting can be obtained from the farm forester, county agricultural agent, or soil conservationist.

The soils in this capability unit are well suited to use as wildlife areas. Planting for wildlife will provide cover and winter food for many kinds of animals. In some areas along the Mississippi and Wisconsin Rivers, dikes can be used to control the level of the water and to improve the areas for waterfowl and fur-bearing animals. The marshy areas, where various kinds of grasses and sedges grow, require protection from fire.

CAPABILITY UNIT VIe-1

This unit consists of moderately deep to deep, medium- to coarse-textured soils that are underlain by sand, sandstone, or red clay. Most of the soils are well drained; they are sloping to steep. The following soils are in this mapping unit:

Dubuque silt loam, 20 to 30 percent slopes.
Dubuque silt loam, 20 to 30 percent slopes, moderately eroded.
Dubuque silt loam, deep, 20 to 30 percent slopes.
Dubuque silt loam, deep, 20 to 30 percent slopes, moderately eroded.
Dubuque soils, 12 to 20 percent slopes, severely eroded.
Dubuque soils, deep, 12 to 20 percent slopes, severely eroded.
Dubuque cherty silt loam, 12 to 20 percent slopes.
Dubuque cherty silt loam, 12 to 20 percent slopes, moderately eroded.
Fayette silt loam, uplands, 12 to 20 percent slopes, severely eroded.
Fayette silt loam, uplands, 20 to 30 percent slopes.
Fayette silt loam, uplands, 20 to 30 percent slopes, moderately eroded.
Fayette silt loam, valleys, 20 to 30 percent slopes.
Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded.
Gale silt loam, 20 to 30 percent slopes.
Gale silt loam, 20 to 30 percent slopes, moderately eroded.
Hesch sandy loam, 12 to 20 percent slopes, moderately eroded.
Hesch loam, 20 to 30 percent slopes, moderately eroded.
Hixton sandy loam, 12 to 20 percent slopes.
Hixton sandy loam, 12 to 20 percent slopes, moderately eroded.
Hixton loam, 20 to 30 percent slopes.
Hixton loam, 20 to 30 percent slopes, moderately eroded.
Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded.
Norden fine sandy loam, 20 to 30 percent slopes.
Norden fine sandy loam and loam, 20 to 30 percent slopes, moderately eroded.
Terrace escarpments, loamy.

The soils in this unit are well suited to permanent pasture, to trees, and to use as wildlife areas. Hay or pasture crops grow well, but most of the areas need to be fertilized and reseeded or renovated to obtain high yields and to provide a sod that is more resistant to erosion. On the stony soils, machinery cannot be used to improve the pastures.

Some of the soils in this unit are in trees. Part of the woodland is pastured, although the wooded areas are not suitable for pasture and provide only poor-quality forage. Grazing and trampling of these areas by livestock causes a serious hazard of erosion. The livestock damage young trees so that future forests are destroyed; they form trails up the sides of steep hills, where runoff concentrates and forms gullies. In places the gullies advance into less sloping areas on the ridgetops that are suitable for crops.

Brush and trees should be cleared from wooded areas that are needed for pasture. Grasses and legumes can

then be seeded without their growth being hindered by the shade from the trees. Areas that are already in pasture ought to be renovated and seeded to alfalfa and bromegrass. The alfalfa and bromegrass will yield more per acre than the native bluegrass, but they also remove more nutrients from the soil. The nutrients will have to be replaced to maintain a high level of production.

Good management will improve the yields of timber. Also, if the woodlands are well managed, runoff is reduced and damage from erosion to fields below the woodlands is lessened; flooding of streams in the bottom lands is also reduced.

If a high level of production is to be maintained, the plant nutrients that have been removed by crops and those that have been lost by pasturing, erosion, or leaching must be replaced. This can be done by applying barnyard manure and commercial fertilizer. The fertilizer should be added in the kinds and amounts indicated by soil tests.

Oats may be grown as a nurse crop when seeding to alfalfa and bromegrass. If there is danger of lodging, drill part of the fertilizer when the small grain is seeded and apply the rest after harvest. If there is little danger of lodging, broadcast all of the fertilizer before seeding.

In long cropping systems, alfalfa will need to be topdressed after the first year of hay. The amount of fertilizer needed will depend upon the needs indicated by soil tests.

Lime should be applied according to the pH of the soil, the type of liming material to be used, and the crop to be grown. For a cropping system consisting of small grain and hay crops, more than 3 tons of lime is needed per acre. Apply the lime, cultivate twice to a depth of at least 4 inches, using a field cultivator, and then plow. Before seeding the grain and legume, cultivate at least twice to plow depth. In this way the lime and soil will be well mixed.

CAPABILITY UNIT VIs-3

This unit consists of moderately deep to deep, sandy or stony soils that are sloping to moderately steep. The soils are well drained to somewhat excessively drained. They are naturally droughty. Because of the texture of their subsoils they erode easily and are susceptible to gully erosion if they are not protected. The following soils are in this unit.

Cherty alluvial land.
Gotham loamy fine sand, 6 to 12 percent slopes.
Gotham loamy fine sand, 6 to 12 percent slopes, eroded.
Hixton stony loam, 12 to 20 percent slopes.

The soils in this unit are not suited to tilled crops, but they are suited to pasture, trees, or to use as wildlife areas. Hay and pasture crops grow well only if the areas are fertilized and reseeded. Machinery cannot be used on the stony or steep soils to help improve the areas for pasture.

Some of the soils in this unit are in trees. Part of the woodland is pastured, but the areas provide only poor-quality forage. Grazing and trampling of these areas by livestock encourages serious erosion. Livestock damage the young trees so that future forests are destroyed; they make trails on the steeper soils, where runoff concentrates and forms gullies. In places these gullies advance into less sloping areas on the ridgetops that are suitable for tilled crops.

Brush and trees should be cleared from the wooded areas that are needed for pasture; grasses and legumes can then be seeded. Areas that are already in pasture should be renovated and seeded to alfalfa and bromegrass. The alfalfa and bromegrass will yield more per acre than native bluegrass, but they will also remove more nutrients from the soil. The nutrients will have to be replaced to maintain a high level of production.

If the soils are kept in trees, livestock should be fenced out of the areas. Good management improves the yields of the woodlands. Also, if the woodlands are well managed, runoff is reduced and damage from erosion to the fields below is lessened. Damage from flooding on the bottom lands is also reduced.

If a high level of production is to be maintained, the plant nutrients that have been removed by crops and those that have been lost through erosion or leaching must be replaced. This can be done by applying barnyard manure and commercial fertilizer. The fertilizer should be added in the kinds and amounts indicated by soil tests.

Oats may be grown as a nurse crop when seeding to alfalfa and bromegrass hay. If there is danger of lodging, drill part of the fertilizer when the small grain is seeded, and apply the rest after harvest. If there is little danger of lodging, broadcast the entire amount before seeding.

In long cropping systems alfalfa will need to be topdressed after the first year of hay. The amount needed depends upon the needs indicated by soil tests.

Lime should be applied according to the pH of the soil, the type of liming material to be used, and the crop to be grown. For a cropping system consisting of a small grain and hay, more than 3 tons of lime are needed per acre. Apply the lime, cultivate to a depth of at least 4 inches with a field cultivator, and then plow. Before seeding the small grain and legume, cultivate at least twice to plow depth. In this way the lime will be well mixed with the soil.

CAPABILITY UNIT VIIe-1

The soils in this unit are steep, moderately deep to deep, and medium to coarse textured. They are well drained and overlie sandstone or red clay that weathered from limestone. Some of the soils are cherty; others are severely eroded. All of them are steep to very steep. The hazard of erosion is severe. The following soils are in this unit:

Dubuque silt loam, 30 to 45 percent slopes.
Dubuque cherty silt loam, 20 to 30 percent slopes.
Dubuque cherty silt loam, 20 to 30 percent slopes, moderately eroded.
Fayette silt loam, uplands, 20 to 30 percent slopes, severely eroded.
Fayette silt loam, valleys, 30 to 45 percent slopes.
Gullied land.
Hixton sandy loam, 20 to 30 percent slopes.
Hixton sandy loam, 20 to 30 percent slopes, moderately eroded.
Hixton sandy loam, 30 to 45 percent slopes.
Norden fine sandy loam and loam, 30 to 45 percent slopes.

The soils in this unit are best suited to trees. They can be used for pasture only if they are managed carefully.

If the soils are used for pasture, they should be fertilized early in spring, or as soon as the frost is out of

the ground. Grazing should also be controlled so that a good stand of grass is kept on the areas throughout the year. If overgrazed, the soils will erode. If they become eroded, the steep, south-facing slopes are difficult to reseed, and runoff water from the exposed areas will damage the fields that lie immediately below. Also, the silt and sand carried by the runoff water will be deposited in streams and cause an overall rise in the water table on the bottom lands. Swamps caused by accumulations of material eroded from slopes are apparent in the lower end of the Kickapoo Valley.

The areas in woodland need to be protected from damage by fire and livestock. Selective cutting of trees will encourage the more desirable kinds of trees to grow. White, Norway, and Scotch pine, and Norway and white spruce are suitable species to plant in open areas. To attract wildlife, pile brush along the edge of wooded areas or near openings in the woods. Leave den trees standing, and keep shrubs in the woodland borders.

CAPABILITY UNIT VIIs-3

This unit consists of moderately deep to deep, droughty, sandy, stony, or rocky soils. The soils overlie deep sand or sandstone bedrock. They are sloping to very steep and are somewhat excessively drained to excessively drained. Most of the soils do not have enough moisture-supplying capacity to keep a cover of sod growing. All of the soils require protection from erosion by wind or water. The following soils are in this unit:

Boone fine sand, 12 to 30 percent slopes.
Chelsea fine sand, 6 to 12 percent slopes, eroded.
Chelsea fine sand, 12 to 20 percent slopes, eroded.
Chelsea fine sand, 20 to 30 percent slopes, eroded.
Hixton stony loam, 20 to 30 percent slopes.
Sparta loamy fine sand, 6 to 12 percent slopes.
Sparta loamy fine sand, 6 to 12 percent slopes, eroded.
Steep stony and rocky land.
Stony colluvial land.
Terrace escarpments, sandy.

The soils in this unit are best suited to trees and to use as wildlife areas. Norway, white, Scotch, jack pine, or other suitable pines should be planted on the sandy soils. The steep, stony soils, however, are best suited to hardwoods.

The soils left in grass will need fertilizer early in spring or as soon as the frost is out of the ground if they are pastured. To obtain good yields, apply a fertilizer that has a ratio of 2-1-1 or 1-1-1, for example, 14-7-7 or 10-10-10. Apply the fertilizer so as to add about 60 pounds of nitrogen per acre. If soil tests indicate that the amount of available phosphate and potash is satisfactory, nitrogen fertilizer alone can be used.

Estimated Yields

The estimated average yields of the principal field and forage crops obtained on each soil in Crawford County are given in table 3. The estimates are based on interviews with farmers; on the results obtained by the staff of the agricultural experiment station on test plots located within the county; and on observations made by soil surveyors, work unit conservationists, and other agricultural workers who are familiar with the soil.[3]

[3] KLINGELHOETS, A. J. PRODUCTIVITY RATINGS FOR SOILS OF CRAWFORD, GRANT, AND RICHLAND COUNTIES, WISCONSIN. 1948. [Unpublished thesis, Univ. of Wis.]

TABLE 3.—*Estimated average acre yields of principal crops under two levels of management*

[Absence of yield indicates soil is not suitable for the crop or that the crop ordinarily is not grown]

Soil units	Corn (grain)		Corn (silage)		Oats		Clover-timothy hay		Alfalfa-bromegrass hay		Permanent pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Alluvial land	45	75	9.0	11.5	40	60	1.5	2.0	2.0	3.0	100	145
Alluvial land, poorly drained [2]											50	80
Arenzville silt loam	60	85	10.5	12.0	52	65	2.0	2.5	3.2	3.8	110	145
Bertrand silt loam, 2 to 6 percent slopes	60	90	10.5	12.0	52	70	2.0	2.5	3.0	3.5	95	130
Bertrand silt loam, 0 to 2 percent slopes	60	90	10.5	12.0	55	70	2.0	2.5	3.0	3.5	95	130
Bertrand silt loam, 2 to 6 percent slopes, moderately eroded	55	90	10.5	12.0	50	70	1.8	2.4	2.8	3.3	85	125
Bertrand silt loam, 6 to 12 percent slopes, moderately eroded	50	85	10.0	12.0	45	65	1.8	2.4	2.7	3.2	85	125
Boone fine sand, 12 to 30 percent slopes											20	35
Chaseburg silt loam, 0 to 6 percent slopes	64	88	11.0	12.0	55	75	2.0	2.5	3.0	3.7	105	140
Chaseburg silt loam, 6 to 12 percent slopes	60	85	10.5	12.0	50	70	1.8	2.4	3.0	3.5	95	135
Chelsea fine sand, 12 to 20 percent slopes, eroded											22	43
Chelsea fine sand, 6 to 12 percent slopes, eroded					16	20	.5	.7	.7	.9	24	45
Chelsea fine sand, 20 to 30 percent slopes, eroded											20	38
Cherty alluvial land												
Dakota sandy loam, 0 to 3 percent slopes	55	75	10.5	11.5	45	65	1.8	2.2	2.2	3.0	80	115
Dakota loam, 0 to 3 percent slopes	60	85	10.5	12.0	50	70	2.0	2.4	2.5	3.2	85	120

See footnotes at end of table.

TABLE 3.—*Estimated average acre yields of principal crops under two levels of management*—Continued

[Absence of yield indicates soil is not suitable for the crop or that the crop ordinarily is not grown]

Soil units	Corn (grain)		Corn (silage)		Oats		Clover-timothy hay		Alfalfa-bromegrass hay		Permanent pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Downs silt loam, 6 to 12 percent slopes, moderately eroded	58	90	10.5	12.0	48	68	1.8	2.5	2.7	3.4	90	135
Downs silt loam, 2 to 6 percent slopes	60	95	10.5	12.5	55	75	2.0	2.6	3.0	3.5	100	140
Downs silt loam, 2 to 6 percent slopes, moderately eroded	58	95	10.5	12.5	50	70	2.0	2.5	2.8	3.5	95	135
Downs silt loam, 12 to 20 percent slopes, moderately eroded	47	78	9.5	11.7	42	62	1.7	2.4	2.5	3.1	80	125
Dubuque silt loam, 20 to 30 percent slopes	------	------	------	------	35	50	1.2	1.6	1.8	2.5	60	85
Dubuque silt loam, 2 to 6 percent slopes, moderately eroded	45	73	9.0	11.0	38	58	1.4	1.9	2.2	2.8	70	110
Dubuque silt loam, 6 to 12 percent slopes, moderately eroded	45	70	9.0	11.0	35	55	1.2	1.8	2.0	2.7	65	100
Dubuque silt loam, 12 to 20 percent slopes	------	------	------	------	38	58	1.3	1.8	2.0	2.6	65	95
Dubuque silt loam, 12 to 20 percent slopes, moderately eroded	------	------	------	------	35	55	1.2	1.6	1.8	2.5	60	85
Dubuque silt loam, 20 to 30 percent slopes, moderately eroded	------	------	------	------	32	48	1.0	1.5	1.5	2.3	55	80
Dubuque silt loam, 30 to 45 percent slopes		------	------	------	------	------	------	------	------	------	55	78
Dubuque soils, 12 to 20 percent slopes, severely eroded	------	------	------	------	32	55	1.0	1.5	1.7	2.5	50	80
Dubuque soils, 6 to 12 percent slopes, severely eroded	40	60	8.0	10.5	35	55	1.2	1.7	1.8	2.5	55	80
Dubuque soils, deep, 12 to 20 percent slopes, severely eroded	------	------	------	------	38	58	1.5	2.0	2.0	2.8	70	110
Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded	45	75	9.0	11.5	40	62	1.6	2.2	2.2	3.0	75	115
Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded	55	85	10.5	12.0	48	65	1.7	2.3	2.6	3.2	85	125
Dubuque silt loam, deep, 6 to 12 percent slopes	58	85	10.5	12.0	50	65	1.8	2.5	2.6	3.3	85	130
Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded	55	80	10.5	11.5	45	63	1.7	2.3	3.4	3.2	80	125
Dubuque silt loam, deep, 12 to 20 percent slopes	50	80	10.0	11.5	45	65	1.7	2.4	2.4	3.2	80	125
Dubuque silt loam, deep, 20 to 30 percent slopes	------	------	------	------	40	60	1.6	2.2	2.3	3.0	75	110
Dubuque silt loam, deep, 20 to 30 percent slopes, moderately eroded	------	------	------	------	35	58	1.5	2.1	2.0	2.7	65	105
Dubuque cherty silt loam, 12 to 20 percent slopes	------	------	------	------	35	55	1.2	1.8	1.8	2.4	60	90
Dubuque cherty silt loam, 6 to 12 percent slopes	------	------	------	------	40	60	1.6	2.3	2.3	2.8	75	118
Dubuque cherty silt loam, 12 to 20 percent slopes, moderately eroded	------	------	------	------	32	50	1.0	1.5	1.6	2.2	50	80
Dubuque cherty silt loam, 20 to 30 percent slopes	------	------	------	------	------	------	------	------	------	------	50	80
Dubuque cherty silt loam, 20 to 30 percent slopes, moderately eroded	------	------	------	------	------	------	------	------	------	------	45	75
Ettrick silt loam	------	85	------	12.0	------	70	------	2.5	------	3.5	80	145
Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded	45	75	9.0	11.5	40	60	1.6	2.3	2.4	3.0	75	120
Fayette silt loam, uplands, 2 to 6 percent slopes	55	90	10.5	12.0	52	75	2.0	2.6	3.0	3.5	95	140
Fayette silt loam, uplands, 2 to 6 percent slopes, moderately eroded	52	85	10.5	12.0	50	70	1.8	2.5	2.8	3.3	85	130
Fayette silt loam, uplands, 6 to 12 percent slopes	52	85	10.5	12.0	50	72	2.0	2.5	3.0	3.5	90	135
Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded	50	80	10.0	11.5	45	65	1.8	2.4	2.6	3.3	85	125
Fayette silt loam, uplands, 6 to 12 percent slopes, severely eroded	47	75	9.5	11.5	42	60	1.8	2.2	2.4	3.0	75	120
Fayette silt loam, uplands, 12 to 20 percent slopes	50	80	10.0	11.5	45	65	1.8	2.4	2.5	3.0	80	125
Fayette silt loam, uplands, 12 to 20 percent slopes, severely eroded	------	------	------	------	38	55	1.5	2.0	2.2	2.8	70	110
Fayette silt loam, uplands, 20 to 30 percent slopes	------	------	------	------	40	58	1.6	2.3	2.4	3.0	73	115
Fayette silt loam, uplands, 20 to 30 percent slopes, moderately eroded	------	------	------	------	38	55	1.5	2.2	2.2	2.8	70	110
Fayette silt loam, uplands, 20 to 30 percent slopes, severely eroded	------	------	------	------	------	------	------	------	------	------	65	105
Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded	------	------	------	------	38	60	1.5	2.0	2.0	2.8	70	110

See footnotes at end of table.

TABLE 3.—*Estimated average acre yields of principal crops under two levels of management*—Continued

[Absence of yield indicates soil is not suitable for the crop or that the crop ordinarily is not grown]

Soil units	Corn (grain)		Corn (silage)		Oats		Clover-timothy hay		Alfalfa-bromegrass hay		Permanent pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Fayette silt loam, valleys, 2 to 6 percent slopes	60	95	10.5	12.0	55	80	2.2	2.6	3.2	3.6	105	145
Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded	55	85	10.5	12.0	50	75	2.0	2.6	2.8	3.4	90	130
Fayette silt loam, valleys, 12 to 20 percent slopes	53	85	9.5	11.5	50	70	2.0	2.4	3.0	3.4	100	145
Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded	48	75	9.5	11.5	45	65	1.8	2.4	2.6	3.2	85	130
Fayette silt loam, valleys, 20 to 30 percent slopes					40	65	1.6	2.2	2.2	2.8	70	115
Fayette silt loam, valleys, 30 to 45 percent slopes											58	95
Gale silt loam, 12 to 20 percent slopes, moderately eroded	46	73	9.5	11.0	38	55	1.3	1.8	1.6	2.2	55	90
Gale silt loam, 2 to 6 percent slopes, moderately eroded	52	78	10.5	11.5	48	65	1.6	2.2	2.2	2.8	70	110
Gale silt loam, 6 to 12 percent slopes, moderately eroded	50	76	10.0	11.5	40	80	1.4	1.8	1.8	2.4	65	100
Gale silt loam, 12 to 20 percent slopes	48	74	9.8	11.3	40	80	1.4	1.8	1.8	2.5	60	105
Gale silt loam, 20 to 30 percent slopes					38	55	1.2	1.6	1.6	2.2	55	90
Gale silt loam, 20 to 30 percent slopes, moderately eroded					35	50	1.0	1.5	1.6	2.2	55	85
Gotham loamy fine sand, 6 to 12 percent slopes, eroded	32	55	7.0	10.5	35	52	.7	1.2	1.5	2.0	45	75
Gotham loamy fine sand, 2 to 6 percent slopes	40	60	8.0	10.5	40	60	1.0	1.4	1.6	2.2	50	85
Gotham loamy fine sand, 2 to 6 percent slopes, eroded	35	55	7.0	10.5	38	55	.8	1.2	1.5	2.0	45	80
Gotham loamy fine sand, 6 to 12 percent slopes	34	55	7.0	10.5	37	54	.8	1.2	1.5	2.0	45	80
Gullied land												
Hesch sandy loam, 12 to 20 percent slopes, moderately eroded					32	52	1.0	1.4	1.5	2.0	50	85
Hesch loam, 20 to 30 percent slopes, moderately eroded					36	52	1.3	1.7	1.6	2.1	56	88
Hesch loam, 12 to 20 percent slopes	45	72	9.2	10.8	40	58	1.4	1.8	1.8	2.3	60	95
Hixton sandy loam, 12 to 20 percent slopes, moderately eroded					30	50	.8	1.2	1.4	1.8	45	80
Hixton sandy loam, 2 to 6 percent slopes	47	78	9.1	11.5	42	62	1.4	1.9	2.0	2.6	65	98
Hixton sandy loam, 6 to 12 percent slopes, moderately eroded	40	65	8.0	11.0	32	55	.8	1.4	1.6	2.2	50	85
Hixton sandy loam, 12 to 20 percent slopes	38	63	8.0	11.0	32	58	.8	1.4	1.7	2.3	55	85
Hixton sandy loam, 20 to 30 percent slopes											40	70
Hixton sandy loam, 20 to 30 percent slopes, moderately eroded											35	65
Hixton sandy loam, 30 to 45 percent slopes											30	
Hixton loam, 20 to 30 percent slopes					36	54	1.0	1.2	1.4	2.1	55	85
Hixton loam, 6 to 12 percent slopes, moderately eroded	48	78	9.8	11.3	38	56	1.2	1.6	1.6	2.3	60	95
Hixton loam, 12 to 20 percent slopes					38	58	1.3	1.7	1.7	2.3	60	90
Hixton loam, 12 to 20 percent slopes, moderately eroded					36	54	1.1	1.4	1.4	2.1	55	85
Hixton loam, 20 to 30 percent slopes, moderately eroded					33	49	.8	1.1	1.4	2.1	55	80
Hixton stony loam, 20 to 30 percent slopes											50	80
Hixton stony loam, 12 to 20 percent slopes					35	50	1.0	1.5	1.6	2.2	57	85
Jackson silt loam, 0 to 2 percent slopes	60	90	10.5	12.0	55	75	2.0	2.5	3.0	3.5	100	145
Jackson silt loam, 2 to 6 percent slopes	60	90	10.5	12.0	55	70	2.0	2.5	3.0	3.5	95	140
Jackson silt loam, 2 to 6 percent slopes, moderately eroded	55	90	10.5	12.0	52	70	1.8	2.4	2.8	3.3	85	130
Judson cherty silt loam, 6 to 12 percent slopes	50	82	9.7	11.2	38	54	1.2	1.5	1.5	2.3	60	95
Judson cherty silt loam, 2 to 6 percent slopes	58	87	10.1	11.7	43	60	1.8	2.3	2.1	2.9	80	122
Judson silt loam, 0 to 6 percent slopes	63	95	10.6	12.3	53	68	2.2	2.6	3.1	3.6	107	147
Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded	50	80	10.0	11.5	40	62	1.7	2.3	2.6	3.3	80	125
Lindstrom silt loam, 2 to 6 percent slopes	62	95	11.0	12.0	55	75	2.2	2.6	3.2	3.7	110	145
Lindstrom silt loam, 6 to 12 percent slopes	60	90	11.0	12.0	50	70	2.0	2.5	3.0	3.5	85	135
Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded	55	85	10.5	12.0	45	65	1.8	2.4	2.8	3.4	90	130
Lindstrom silt loam, 12 to 20 percent slopes	55	80	10.5	11.5	45	65	1.8	2.4	2.8	3.4	85	125

See footnotes at end of table.

TABLE 3.—*Estimated average acre yields of principal crops under two levels of management*—Continued

[Absence of yield indicates soil is not suitable for the crop or that the crop ordinarily is not grown]

Soil units	Corn (grain)		Corn (silage)		Oats		Clover-timothy hay		Alfalfa-bromegrass hay		Permanent pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded	------	------	------	------	38	60	1. 4	1. 9	2. 3	2. 8	65	105
Medary silt loam, 0 to 2 percent slopes	50	75	10. 0	11. 5	50	65	1. 8	2. 4	------	3. 0	90	125
Medary silt loam, 2 to 6 percent slopes	45	70	9. 5	11. 0	48	60	1. 8	2. 3	------	2. 8	85	120
Medary silt loam, 6 to 12 percent slopes, moderately eroded	36	58	8. 2	10. 4	42	53	1. 4	2. 0	------	2. 8	75	112
Meridian sandy loam, 2 to 6 percent slopes	42	75	8. 5	11. 0	42	60	1. 2	1. 7	1. 8	2. 4	55	90
Meridian sandy loam, 0 to 2 percent slopes	45	75	9. 0	11. 5	45	65	1. 2	1. 8	2. 0	2. 5	60	95
Meridian sandy loam, 2 to 6 percent slopes, moderately eroded	40	70	8. 0	11. 0	40	58	1. 0	1. 5	1. 6	2. 2	50	85
Meridian sandy loam, 6 to 12 percent slopes, moderately eroded	35	60	7. 0	11. 0	35	55	. 8	1. 4	1. 5	2. 2	45	85
Meridian loam, 6 to 12 percent slopes, moderately eroded	48	70	9. 0	11. 4	38	60	1. 2	1. 9	1. 7	2. 4	55	100
Meridian loam, 0 to 2 percent slopes	55	87	10. 5	11. 7	45	68	1. 6	2. 2	2. 0	2. 6	70	110
Meridian loam, 2 to 6 percent slopes	55	85	10. 5	11. 5	45	85	1. 6	2. 2	2. 0	2. 6	65	105
Norden fine sandy loam, 20 to 30 percent slopes	------	------	------	------	------	------	------	------	------	------	50	76
Norden fine sandy loam, 12 to 20 percent slopes	40	65	8. 1	11. 2	34	58	1. 0	1. 6	1. 7	2. 3	58	87
Norden fine sandy loam and loam, 12 to 20 percent slopes, moderately eroded	37	62	8. 0	11. 0	33	52	. 9	1. 3	1. 4	1. 9	50	83
Norden fine sandy loam and loam, 20 to 30 percent slopes, moderately eroded	------	------	------	------	------	------	------	------	------	------	45	73
Norden fine sandy loam and loam, 30 to 45 percent slopes	------	------	------	------	------	------	------	------	------	------	35	65
Orion silt loam	45	85	9. 0	12. 0	42	65	2. 0	2. 5	------	3. 5	95	145
Orion silt loam, poorly drained variant	------	80	------	11. 5	------	60	1. 7	2. 5	------	3. 0	95	145
Richwood silt loam, 0 to 2 percent slopes	65	95	11. 0	12. 5	55	70	2. 2	2. 6	3. 2	3. 6	110	145
Richwood silt loam, 2 to 6 percent slopes	60	90	11. 0	12. 5	55	68	2. 0	2. 5	3. 1	3. 5	105	140
Richwood silt loam, 6 to 12 percent slopes	55	90	10. 5	12. 0	50	68	1. 8	2. 5	2. 8	3. 4	90	135
Rowley silt loam, 0 to 2 percent slopes	50	100	10. 0	12. 5	45	70	1. 8	2. 6	------	3. 8	95	150
Rowley silt loam, 2 to 6 percent slopes	50	90	10. 0	12. 5	43	70	1. 8	2. 6	------	3. 8	90	145
Seaton silt loam, 12 to 20 percent slopes, moderately eroded	45	75	9. 0	11. 5	40	58	1. 6	2. 3	2. 3	3. 0	73	118
Seaton silt loam, 2 to 6 percent slopes, moderately eroded	52	82	10. 3	11. 8	48	70	1. 6	2. 3	2. 8	3. 3	84	128
Seaton silt loam, 6 to 12 percent slopes, moderately eroded	50	80	10. 0	11. 5	45	62	1. 6	2. 3	2. 6	3. 2	82	124
Sparta loamy fine sand, 0 to 2 percent slopes	30	45	7. 0	9. 0	35	50	------	------	1. 2	1. 8	40	60
Sparta loamy fine sand, 2 to 6 percent slopes	28	45	6. 0	9. 0	32	45	------	------	1. 2	1. 7	40	55
Sparta loamy fine sand, 2 to 6 percent slopes, eroded	25	40	5. 0	8. 0	28	40	------	------	1. 0	1. 5	30	50
Sparta loamy fine sand, 6 to 12 percent slopes	------	------	------	------	17	22	------	------	. 7	. 9	24	45
Sparta loamy fine sand, 6 to 12 percent slopes, eroded	------	------	------	------	15	19	------	------	. 6	. 8	20	40
Steep stony and rocky land	------	------	------	------	------	------	------	------	------	------	------	------
Stony colluvial land	------	------	------	------	------	------	------	------	------	------	------	------
Tell silt loam, 2 to 6 percent slopes, moderately eroded	45	75	9. 5	11. 5	45	65	1. 5	2. 0	2. 0	2. 4	65	110
Tell silt loam, 0 to 2 percent slopes	55	80	10. 5	11. 5	50	70	1. 8	2. 4	2. 4	3. 0	75	125
Tell silt loam, 6 to 12 percent slopes, moderately eroded	42	75	9. 0	11. 5	40	60	1. 4	1. 8	1. 8	2. 4	65	105
Tell silt loam, 12 to 20 percent slopes, moderately eroded	------	------	------	------	36	53	1. 0	1. 5	1. 3	1. 8	48	88
Terrace escarpments, loamy	------	------	------	------	------	------	------	------	------	------	55	85
Terrace escarpments, sandy	------	------	------	------	------	------	------	------	------	------	35	55
Toddville silt loam, 0 to 2 percent slopes	65	100	11. 0	12. 5	55	70	2. 2	2. 6	3. 0	3. 6	110	150
Toddville silt loam, 2 to 6 percent slopes	60	100	10. 5	12. 5	55	70	2. 2	2. 6	3. 0	3. 6	105	150
Waukegan loam	60	90	10. 7	12. 0	52	70	2. 0	2. 5	2. 8	3. 3	92	135

[1] Cow-acre-days is a term used to express the carrying capacity of pasture. This value is obtained by multiplying the number of animal units carried per acre by the number of days the pasture is grazed during a single grazing season without injury to the sod.

[2] Adequate drainage required to obtain maximum yields.

In columns A are average yields obtained under the management common in the county at the time the soil survey was made. This management includes the use of barnyard manure, starter fertilizer for corn, and little or no fertilizer for small grains or hay crops. It also includes planting hybrid seed corn at the rate of about 12,000 plants per acre. A minimum amount of lime is applied for growing alfalfa. Hayfields are cut twice each year and are grazed in fall. No special practices are used in preparing the seedbed or in cultivating.

Yields in columns B are those to be expected if the management practices suggested under the subsection "Management by Capability Units" are used. These include applying lime and fertilizer according to the amounts indicated by soil tests. For corn, larger amounts of fertilizer are applied than under common management, and fertilizer is used for small grains and hay. Suitable cropping systems are used along with timely seeding, spraying, and cultivating of crops.

For the yields in columns B, hybrid seed corn is planted at the rate of 12,000 to 18,000 plants an acre. Varieties of small grains that have been tested are seeded. If alfalfa is to be grown, enough lime is applied to bring the pH of the soil to 6.5 or 7.0; varieties of alfalfa are seeded that are resistant to wilt and to winterkill; a topdressing of manure or a commercial fertilizer is applied; the crop is harvested to get three crops a year, and there is little or no fall grazing of the fields.

Even higher yields than those given in table 3 are possible. On some soils it will pay to make heavy applications of nitrogen, phosphate, potash, and possibly of minor elements, such as boron. Many farmers can produce more corn than 100 bushels per acre. In some places, especially on light-colored or sandy soils, split applications of nitrogen can be applied as a side dressing to corn or other cultivated crops in addition to plowing under heavy applications of a commercial fertilizer. Consult your county agent or a representative of the experiment station for specific suggestions on the kinds and quantities of fertilizer, lime, and seed to use.

Woodland Uses of Soils

The woodlands on the farms of Crawford County occupy 156,354 acres, or about 42 percent of the total land area. They are widely distributed throughout the county. The trees are mainly hardwoods, predominantly oaks and hickories. Much of the timber taken from the farm woodlots is used on the farm as rough lumber or is used for fenceposts or firewood.

Trees generally grow best on the better agricultural soils, but they will also grow well on soils that are too wet, steep, stony, or eroded for crops. Steep, stony, and sandy soils, for example, are often too droughty for crops that have a shallow root system. Trees on these soils, however, can often make excellent growth if the water table is within reach of their roots. Thus, a soil that is not suitable for field crops may be highly desirable for trees.

Soils that formed under prairie grasses are less well suited to trees than the other soils in the county, and little timber is grown on them. Species of trees suitable for wood products do not grow well on the prairie soils, and the quality of the timber is likely to be poor. The growth of trees is also affected by the heat and dry winds in summer. Trees generally grow well on the cool sites that have north- and east-facing slopes. Trees on the hot, south- and west-facing slopes, however, do not yield so much wood as those on cooler sites, nor is the wood of so good a quality.

***Figure 23.*—Protected woodland that has been cut selectively. Trees of different sizes have been left to provide timber for future forest products. The thick litter on the forest floor soaks up moisture and helps to prevent runoff.**

The productivity of most of the woodlots in Crawford County is much lower than their potential productivity. If well managed for 25 years, a woodlot would give the maximum continuous production of timber. It would provide cash income for the farmer and would help to reduce erosion of the cropland lying below the woodlots. The value of the woodlands can be increased by protecting the areas from grazing, by preventing fires, and by cutting the trees selectively (fig. 23).

Table 4 gives the estimated potential yields of timber grown on the soil types and miscellaneous land types of Crawford County. The figures given are for well-managed stands of hardwoods and pines that have good tree density. To get yields such as these from most of the timber stands in the county requires considerable time. Because of logging, grazing, and fires, most stands of hardwoods now have low tree density.

The board feet and cord figures given in table 4 are for usable timber produced and are not for the total production per acre. The estimated figures are based on interviews with foresters, on observations made by soil surveyors and work unit conservationists, and on results of tests made on woodland plots. The data are based on production estimates that were made by the Wisconsin Conservation Department (*3*), with interpolations for individual soil types.

Engineering Properties of the Soils

This section contains information that will help engineers to select sites for buildings for residential, industrial, and other purposes; to choose locations for highways; to determine the trafficability of soils; and to locate sand, gravel, and rock for use in construction. It

TABLE 4.—*Estimated potential annual acre yields of usable timber produced from well-managed stands that have good tree density*

[Absence of yield indicates trees do not grow on this soil type or that the soil type is not suited to the species indicated]

Name	North- and east-facing sites [1]		South- and west-facing sites [2]	
	Hardwoods	Pines	Hardwoods	Pines
	Bd. ft.	*Bd. ft.*	*Bd. ft.*	*Bd. ft.*
Alluvial land, poorly drained	100	------	------	------
Alluvial land	250	250	------	------
Arenzville silt loam	275	250	------	------
Bertrand silt loam	250	250	------	------
Boone fine sand	------	175	------	100
Chaseburg silt loam	275	------	------	------
Chelsea fine sand [3]	------	150	------	------
Cherty alluvial land	150	------	75	------
Dakota loam	150	275	------	------
Dakota sandy loam [3]	100	250	------	------
Downs silt loam	200	------	125	------
Dubuque cherty silt loam	150	------	100	------
Dubuque silt loam	150	------	100	------
Dubuque silt loam, deep	200	------	125	------
Dubuque soils	125	------	75	------
Dubuque soils, deep	150	------	100	------
Ettrick silt loam	150	------	------	------
Fayette silt loam, uplands	225	300	150	250
Fayette silt loam, valleys	275	300	175	250
Gale silt loam	175	300	100	200
Gotham loamy fine sand [3]	100	250	------	------
Gullied land	150	------	75	------
Hesch loam	150	250	100	200
Hesch sandy loam	150	250	75	200
Hixton loam	150	300	75	200
Hixton sandy loam	150	300	75	200
Hixton stony loam	150	300	75	200
Jackson silt loam	200	------	------	------
Judson silt loam	------	------	------	------
Judson cherty silt loam	------	------	------	------
Lindstrom silt loam	275	------	175	------
Medary silt loam	200	200	------	------
Meridian loam	200	300	------	------
Meridian sandy loam [3]	150	300	------	------
Norden fine sandy loam	200	250	150	200
Norden fine sandy loam and loam	225	250	150	250
Orion silt loam	200	------	------	------
Orion silt loam, poorly drained variant	100	------	------	------
Richwood silt loam	------	------	------	------
Rowley silt loam	------	------	------	------
Seaton silt loam	225	------	150	------
Sparta loamy fine sand [3]	------	[4] 0.5	------	------
Steep stony and rocky land	150	------	75	------
Stony colluvial land	150	------	75	------
Tell silt loam [3]	175	------	------	------
Terrace escarpments, loamy	175	300	75	[5] 0.5
Terrace escarpments, sandy	------	200	------	[5] .3
Toddville silt loam	------	------	------	------
Waukegan loam	------	------	------	------

[1] Sites in narrow valleys and on nearly level valley flats, where the trees are protected from heat and drying winds.

[2] Sites on exposed ridgetops and slopes, where the soils are exposed to high temperatures and drying winds.

[3] If the water table is within 10 feet of the surface, larger yields may be expected.

[4] On north- and east-facing slopes, pines on Sparta loamy fine sand yield 0.5 cord per acre.

[5] On south- and west-facing slopes, pines on Terrace escarpments, loamy, yield 0.5 cord per acre, and on Terrace escarpments, sandy, they yield 0.3 cord per acre.

will also help in planning dams, ponds, and other structures to control floods and conserve soil and water.

The soil map and accompanying report are too generalized for some engineering purposes, but they provide information that is valuable in planning detailed engineering field surveys and tests to determine the in-place condition of soils at proposed sites for construction. After testing the soil materials and observing their behavior in place and under varying conditions, the engineer can anticipate, to some extent, the properties of individual soils wherever they are mapped.

Some of the terms used by the soil scientist may not be familiar to the engineer; other terms, though familiar, have special meanings in soil science. The terms used in the three tables, and other special terms used in the report are discussed in the section "Descriptions of Soils" or are defined in "Meanings of Technical Terms."

Soil test data

Engineers who work with foundations and embankments need to know about the soils. Information about soils that cover a large area is especially valuable in the construction of highways. This is obtained partly by observing soils in the field and by studying the interpretations made by soil scientists.

Table 5 describes the soils and the properties that are significant to engineering.

Table 6 describes the erodibility hazard of each soil; the suitability of each as a source of topping material, of sand, or of fill material for earthern embankments; and the suitability of each as a pond site, for drainage, for irrigation, and for terraces or diversions. The information about many of the soils is estimated because samples were taken from only seven soil series in the county (see table 7). The estimates were made by comparing the soil shown with a soil that had been tested.

Table 7 gives data showing moisture-density relationships, results of mechanical analysis, and the liquid limit and plasticity index for several of the principal soils. Some of the soil samples described in table 7 were collected by the Soil Conservation Service and were tested by the Division of Physical Research, U.S. Bureau of Public Roads. The rest were collected and tested by the Soil Conservation Service. For the samples tested by the Bureau of Public Roads, the engineering soil classifications given in this table were based on data obtained by mechanical analysis and by tests to determine the liquid limit and plasticity index. Results of the mechanical analyses of the Bureau of Public Roads were determined by using combined sieve and hydrometer methods. Percentages of clay obtained by the hydrometer method should not be used in naming the textural classes of soils.

The tests to show liquid limit and plastic limit measure the effect of water on the consistence of the soil material. As the moisture content of a soil material increases from a dry state, the material changes from a solid to a semisolid or plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a solid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The

plasticity index is the numerical difference between the liquid limit and plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

Tests for liquid limit and plastic limit were not run on the samples obtained and tested by the Soil Conservation Service. The American Association of State Highway Officials (AASHO) and Unified Classification ratings for these samples are estimates based on comparisons with similar soils.

Problems in engineering

Soils that erode easily or that are poorly drained present special engineering problems. For example, the soils that have clean sand in the profile and a deep water table are easily eroded by wind when they are exposed in roadways.

In soils that are poorly drained, seepage along the backslope of cuts may cause slumping or sliding of the overlying material. A perched water table beneath a

TABLE 5.—*Brief descriptions of the soils of Crawford*

Map symbol	Soil	Soil description	Depth to bedrock	Geologic formation
Aa	Alluvial land, poorly drained	Poorly drained, mixed sandy and silty soil materials, more than 42 inches thick, on the nearly level flood plains of streams.	20 feet or more	(5)
Ab	Alluvial land	Well-drained, mixed sandy and silty soil materials, 42 or more inches thick, on the nearly level flood plains of streams.	20 feet or more	(5)
Ar	Arenzville silt loam	Well drained to moderately well drained, deep, silty alluvial soil on the nearly level flood plains of streams; the surface layer is friable, granular silt loam; the underlying material is friable, massive silt containing thin lenses of fine sand.	20 feet or more	(5)
BeA BeB BeB2 BeC2	Bertrand silt loam, 0 to 2 percent slopes. Bertrand silt loam, 2 to 6 percent slopes. Bertrand silt loam, 2 to 6 percent slopes, moderately eroded. Bertrand silt loam, 6 to 12 percent slopes, moderately eroded.	Well-drained, silty soils on stream terraces; the surface layer is friable, granular silt loam, and the subsoil is firm, subangular blocky silty clay loam; underlain by friable, stratified silt and sand at a depth below 42 inches.	20 feet or more	(5)
BoD	Boone fine sand, 12 to 30 percent slopes.	Excessively drained, sandy soil developed on uplands; the surface soil is very friable, single grain fine sand, and the subsoil is a loose, single grain fine sand.	18 inches to 5 feet.	St. Peter and Cambrian sandstones.
CaB CaC	Chaseburg silt loam, 0 to 6 percent slopes. Chaseburg silt loam, 6 to 12 percent slopes.	Well drained to moderately well drained, silty alluvial soils in narrow valleys and on fans; the surface soil is friable, granular silt loam, the subsoil is friable silt loam, and the substratum is friable, massive silt loam; in places there are strata of fine sand in the profile; in most places stones are on the surface.	4 feet or more	Cambrian sandstone
ChC2 ChD2 ChE2	Chelsea fine sand, 6 to 12 percent slopes, eroded. Chelsea fine sand, 12 to 20 percent slopes, eroded. Chelsea fine sand, 20 to 30 percent slopes, eroded.	Excessively drained, deep, sandy soils developed on valley slopes above high terraces; the surface soil and subsoil are loose fine sand; in many places, at a depth of 42 inches or more, there are bands of sandy loam that are 4 to 10 inches thick.	20 feet or more	(5)
Ct	Cherty alluvial land	Sandy and cherty soil materials on bottom lands near stream channels; material is of variable thickness.	(5)	(5)
DaA	Dakota loam, 0 to 3 percent slopes	Well-drained soil developed on nearly level to gently sloping stream terraces in medium-textured outwash that is 24 to 36 inches thick over sand; the surface soil is friable, granular loam, the subsoil is friable, subangular blocky loam underlain by loose, single grain, stratified sand that contains a few pebbles.	20 feet or more	(5)

See footnotes at end of table.

pavement may result in freezing and thawing in the saturated foundation material. This, in turn, causes differential volume change and differences in bearing capacity. Consequently, before beginning the construction of a road, it is important to know the location of poorly drained areas. The poorly drained areas should be inspected in greater detail than other areas to determine the need for interceptor drains and underdrains.

There are only a few small areas of poorly drained soils in the uplands. Extensive areas of poorly drained soils occur on the benches and bottoms along streams throughout the county. Adequate drainage must be provided for roads through poorly drained areas.

Some of the lower parts of the bottom lands are flooded each year. In these areas embankments may be needed to protect the structures. By constructing drainage ditches before earthwork is begun, some of the sandy soils that have a high water table may be made more suitable as a source of borrow material, as well as for excavation for roads.

County and estimates of properties significant to engineering

Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
			Subsoil	Substratum	
		Feet			
Moderate	Intermediate	1 to 5	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Slightly acid to neutral.
Moderate	Intermediate	3 to 5	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Slightly acid to neutral.
Moderate	Intermediate	5 to 10	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Slightly acid to neutral.
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Slightly acid to medium acid.
Very rapid	High	More than 10	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Medium acid to strongly acid.
Moderate	Intermediate	More than 5	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Medium acid to neutral.
Very rapid	High	More than 5	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Medium acid to strongly acid.
Very rapid	High	More than 1	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Slightly acid.
Moderate	Intermediate	More than 5	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Slightly acid to neutral.

TABLE 5.—*Brief descriptions of the soils of Crawford County*

Map symbol	Soil	Soil description	Depth to bedrock	Geologic formation
DkA	Dakota sandy loam, 0 to 3 percent slopes.	Well-drained soil developed on stream terraces in a layer of moderately coarse textured outwash that is 24 to 36 inches thick over sand; the surface soil is very friable, granular sandy loam, and the subsoil is friable, weak, subangular blocky sandy loam to loam, underlain by stratified, loose, single grain sand containing some gravel.	20 feet or more	([5])
DoB	Downs silt loam, 2 to 6 percent slopes.	Well-drained, deep, silty soils developed on sloping upland ridges; the surface soil is friable, granular silt loam, the subsoil is firm, subangular blocky silty clay loam, and the substratum is friable, massive silt loam.	4 feet or more	Platteville and Prairie du Chien dolomites.
DoB2	Downs silt loam, 2 to 6 percent slopes, moderately eroded.			
DoC2	Downs silt loam, 6 to 12 percent slopes, moderately eroded.			
DoD2	Downs silt loam, 12 to 20 percent slopes, moderately eroded.			
DtC	Dubuque cherty silt loam, 6 to 12 percent slopes.	Well-drained, stony soils developed on upland ridges in a thin mantle of silt over reddish clay from limestone bedrock; the surface soil is friable, granular stony silt loam; the subsoil is subangular blocky, gritty silty clay, and the substratum is clay.	2 to 4 feet	Platteville and Prairie du Chien dolomites.
DtD	Dubuque cherty silt loam, 12 to 20 percent slopes.			
DtD2	Dubuque cherty silt loam, 12 to 20 percent slopes, moderately eroded.			
DtE	Dubuque cherty silt loam, 20 to 30 percent slopes.			
DtE2	Dubuque cherty silt loam, 20 to 30 percent slopes, moderately eroded.			
DuB2	Dubuque silt loam, 2 to 6 percent slopes, moderately eroded.	Well-drained soils developed on upland ridges in a thin layer of silt over reddish clay derived from limestone bedrock; the surface soil is friable, granular silt loam, the subsoil is firm, subangular blocky silty clay loam, and the substratum is angular blocky clay that contains many angular fragments of chert.	2 to 4 feet	Platteville and Prairie du Chien dolomites.
DuC2	Dubuque silt loam, 6 to 12 percent slopes, moderately eroded.			
DuD	Dubuque silt loam, 12 to 20 percent slopes.			
DuD2	Dubuque silt loam, 12 to 20 percent slopes, moderately eroded.			
DuE	Dubuque silt loam, 20 to 30 percent slopes.			
DuE2	Dubuque silt loam, 20 to 30 percent slopes, moderately eroded.			
DuF	Dubuque silt loam, 30 to 45 percent slopes.			
DvB2	Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded.	Well-drained soils developed on upland ridges in a moderately deep blanket of silt over reddish clay derived from limestone bedrock; the surface soil is friable, granular silt loam, the subsoil is firm, subangular blocky silty clay loam, and the substratum is angular blocky, gritty clay that contains many fragments of chert.	3 to 6 feet	Platteville and Prairie du Chien dolomites.
DvC	Dubuque silt loam, deep, 6 to 12 percent slopes.			
DvC2	Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded.			
DvD	Dubuque silt loam, deep, 12 to 20 percent slopes.			
DvD2	Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded.			
DvE	Dubuque silt loam, deep, 20 to 30 percent slopes.			
DvE2	Dubuque silt loam, deep, 20 to 30 percent slopes, moderately eroded.			
DwC3	Dubuque soils, 6 to 12 percent slopes, severely eroded.	Well-drained, shallow to moderately deep soils developed on upland ridges in red clay derived from limestone bedrock; the surface soil is firm, granular silty clay loam, the subsoil is subangular blocky silty clay, and the substratum is subangular blocky clay that contains many fragments of chert.	1 to 3 feet	Platteville and Prairie du Chien dolomites.
DwD3	Dubuque soils, 12 to 20 percent slopes, severely eroded.			
DxD3	Dubuque soils, deep, 12 to 20 percent slopes, severely eroded.			

See footnotes at end of table.

and estimates of properties significant to engineering—Continued

Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
			Subsoil	Substratum	
		Feet			
Moderately rapid.	High	More than 5	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Slightly acid to neutral.
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Slightly acid to medium acid.
Moderately slow.	Intermediate	More than 10	Sticky and plastic	Very sticky and very plastic.	Medium acid to neutral.
Moderately slow.	Intermediate	More than 10	Slightly sticky and slightly plastic.	Very sticky and very plastic.	Slightly acid to neutral.
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Very sticky and very plastic.	Slightly acid to medium acid.
Moderately slow.	Intermediate	More than 10	Sticky and plastic	Very sticky and very plastic.	Slightly acid to neutral.

TABLE 5.—*Brief descriptions of the soils of Crawford County*

Map symbol	Soil	Soil description	Depth to bedrock	Geologic formation
Et	Ettrick silt loam	Poorly drained, deep, silty alluvial material on nearly level high bottoms subject to occasional overflow by streams; the surface soil is friable, granular silt loam, the subsoil is subangular blocky silty clay loam, and the substratum is friable, massive silt.	Very deep	(5)
FaB	Fayette silt loam, uplands, 2 to 6 percent slopes.	Well-drained, deep, silty soils developed on upland ridges; the surface soil is friable, granular silt loam, the subsoil is firm, subangular blocky silty clay loam, and the substratum is friable, massive silt loam.	4 feet or more	Platteville and Prairie du Chien dolomites.
FaB2	Fayette silt loam, uplands, 2 to 6 percent slopes, moderately eroded.			
FaC	Fayette silt loam, uplands, 6 to 12 percent slopes.			
FaC2	Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded.			
FaC3	Fayette silt loam, uplands, 6 to 12 percent slopes, severely eroded.			
FaD	Fayette silt loam, uplands, 12 to 20 percent slopes.			
FaD2	Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded.			
FaD3	Fayette silt loam, uplands, 12 to 20 percent slopes, severely eroded.			
FaE	Fayette silt loam, uplands, 20 to 30 percent slopes.			
FaE2	Fayette silt loam, uplands, 20 to 30 percent slopes, moderately eroded.			
FaE3	Fayette silt loam, uplands, 20 to 30 percent slopes, severely eroded.			
FvB	Fayette silt loam, valleys, 2 to 6 percent slopes.	Well-drained, deep, silty soils developed on the valley slopes of uplands; the surface soil is friable, granular silt loam, the subsoil is subangular blocky, light silty clay loam, and the substratum is friable, massive silt; in places there are many large limestone boulders and some rock outcrops; fine sandy loam occurs in a thin cover in places or in thin strata in the solum.	4 feet or more	Cambrian sandstone
FvC2	Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded.			
FvD	Fayette silt loam, valleys, 12 to 20 percent slopes.			
FvD2	Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded.			
FvE	Fayette silt loam, valleys, 20 to 30 percent slopes.			
FvE2	Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded.			
FvF	Fayette silt loam, valleys, 30 to 45 percent slopes.			
GaB2	Gale silt loam, 2 to 6 percent slopes, moderately eroded.	Well-drained, moderately deep, silty soils developed over sandstone on the valley slopes of uplands; the surface soil is friable, granular silt loam underlain by firm, subangular blocky silty clay loam that grades to the loose, single grain fine sand substratum that rests on sandstone bedrock.	2 to 4 feet	Cambrian sandstone
GaC2	Gale silt loam, 6 to 12 percent slopes, moderately eroded.			
GaD	Gale silt loam, 12 to 20 percent slopes.			
GaD2	Gale silt loam, 12 to 20 percent slopes, moderately eroded.			
GaE	Gale silt loam, 20 to 30 percent slopes.			
GaE2	Gale silt loam, 20 to 30 percent slopes, moderately eroded.			
GoB	Gotham loamy fine sand, 2 to 6 percent slopes.	Somewhat excessively drained, sandy soils developed on stream terraces; the surface soil is very friable, granular loamy fine sand, and the subsoil is friable sandy loam underlain by loose, single grain fine sand at depths of more than 2 feet.	20 feet or more	(5)
GoB2	Gotham loamy fine sand, 2 to 6 percent slopes, eroded.			
GoC	Gotham loamy fine sand, 6 to 12 percent slopes.			
GoC2	Gotham loamy fine sand, 6 to 12 percent slopes, eroded.			
Gu	Gullied land	Well-drained to excessively drained, coarse- to fine-textured soil materials on valley slopes and benches; the gullies have been stabilized or are actively eroding.	10 to 50 feet	(6)

See footnotes at end of table.

and estimates of properties significant to engineering—Continued

Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
			Subsoil	Substratum	
		Feet			
Moderate	Intermediate	1 to 3	Slightly sticky and slightly plastic.	Slightly sticky and slightly plastic.	Slightly acid to neutral.
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and non-plastic.	Slightly acid to medium acid.
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and non-plastic	Slightly acid to medium acid.
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and non-plastic.	Slightly acid to medium acid.
Moderately rapid.	High	More than 10	Nonsticky and non-plastic.	Nonsticky and non-plastic.	Medium acid to neutral.
Moderate to rapid.	Intermediate to high.	More than 10	(5)	(5)	Slightly acid to strongly acid.

TABLE 5.—*Brief descriptions of the soils of Crawford County*

Map symbol	Soil	Soil description	Depth to bedrock	Geologic formation
HeD HeE2	Hesch loam, 12 to 20 percent slopes. Hesch loam, 20 to 30 percent slopes, moderately eroded.	Somewhat excessively drained soils developed on upland valley slopes in medium-textured materials 30 to 42 inches thick over sand and sandstone; the surface soil is friable, granular loam, the subsoil is friable, subangular blocky loam to sandy clay loam that overlies loose, single grain fine sand at a depth of 2½ to 3 feet.	3 to 5 feet	Cambrian sandstone.
HsD2	Hesch sandy loam, 12 to 20 percent slopes, moderately eroded.	Somewhat excessively drained, moderately coarse textured soil on upland valley slopes; the solum is 30 to 42 inches thick over sand and sandstone; the surface soil is friable, granular sandy loam, and the subsoil is friable, subangular blocky fine sandy loam to loam underlain by loose, single grain sand that grades to bedrock.	3 to 5 feet	Cambrian sandstone.
HuB HuC2 HuD HuD2 HuE HuE2 HuF	Hixton sandy loam, 2 to 6 percent slopes. Hixton sandy loam, 6 to 12 percent slopes, moderately eroded. Hixton sandy loam, 12 to 20 percent slopes. Hixton sandy loam, 12 to 20 percent slopes, moderately eroded. Hixton sandy loam, 20 to 30 percent slopes. Hixton sandy loam, 20 to 30 percent slopes, moderately eroded. Hixton sandy loam, 30 to 45 percent slopes.	Well-drained, moderately coarse textured soils on upland valley slopes; the solum is 24 to 36 inches thick over sand and sandstone; the surface soil is very friable, granular sandy loam, the subsoil is friable, subangular blocky loam, and the substratum is loose, single grain fine sand.	3 to 5 feet	Cambrian sandstone.
HtC2 HtD HtD2 HtE HtE2	Hixton loam, 6 to 12 percent slopes, moderately eroded. Hixton loam, 12 to 20 percent slopes. Hixton loam, 12 to 20 percent slopes, moderately eroded. Hixton loam, 20 to 30 percent slopes. Hixton loam, 20 to 30 percent slopes, moderately eroded.	Well-drained soils developed on upland valley slopes in medium-textured materials that are 24 to 36 inches thick over sand and sandstone; the surface soil is friable, granular loam, and the subsoil is friable to firm loam to sandy clay loam underlain by a substratum of loose, single grain fine sand.	3 to 5 feet	Cambrian sandstone.
HyD HyE	Hixton stony loam, 12 to 20 percent slopes. Hixton stony loam, 20 to 30 percent slopes.	Well-drained, stony soils developed on upland valley slopes in a mixture of windblown silt and sand derived from sand and sandstone bedrock; the surface soil is friable and granular; the subsoil is friable, subangular blocky fine sandy loam to sandy clay loam that overlies loose, single grain fine sand that grades to bedrock.	2½ to 4 feet	Cambrian sandstone.
JaA JaB JaB2	Jackson silt loam, 0 to 2 percent slopes. Jackson silt loam, 2 to 6 percent slopes. Jackson silt loam, 2 to 6 percent slopes, moderately eroded.	Moderately well drained, deep, silty soils developed on nearly level to gently sloping stream terraces; the surface soil is friable, granular silt loam, the subsoil is firm, subangular blocky silty clay loam, and the substratum is friable, massive silt; in places stratified fine sand and silt occur at a depth below 42 inches.	20 feet or more	[5]
JcB JcC	Judson cherty silt loam, 2 to 6 percent slopes. Judson cherty silt loam, 6 to 12 percent slopes.	Well-drained, silty alluvial soils in narrow valleys and on fans; the surface soil is friable, granular gravelly loam, and the subsoil is friable, granular gravelly loam that becomes more gravelly and cobbly with increasing depth.	4 feet or more	Cambrian sandstone.

See footnotes at end of table.

and estimates of properties significant to engineering—Continued

Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
			Subsoil	Substratum	
		Feet			
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Medium acid to neutral.
Moderately rapid.	High	More than 10	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Slightly acid to medium acid.
Moderately rapid.	High	More than 10	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Slightly acid to strongly acid.
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Slightly acid to strongly acid.
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Medium acid to neutral.
Moderate	Intermediate	5 to 10	Slightly sticky and plastic.	Nonsticky and nonplastic.	Medium acid to strongly acid.
Moderate	Intermediate	More than 5	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Neutral.

TABLE 5.—*Brief descriptions of the soils of Crawford County*

Map symbol	Soil	Soil description	Depth to bedrock	Geologic formation
JdB	Judson silt loam, 0 to 6 percent slopes	Well-drained, silty alluvial soils in narrow valleys and on fans; the surface soil is friable, granular silt loam, the subsoil is friable, granular, heavy silt loam, and the substratum is friable, granular silt; in places thin layers of fine sand occur in the profile.	4 feet or more	Cambrian sandstone.
LsB LsC LsC2 LsD LsD2 LsE2	Lindstrom silt loam, 2 to 6 percent slopes. Lindstrom silt loam, 6 to 12 percent slopes. Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded. Lindstrom silt loam, 12 to 20 percent slopes. Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded. Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded.	Well-drained, deep, silty soils developed on the valley slopes of uplands; the surface soil is friable, granular silt loam, the subsoil is firm, subangular blocky, light silty clay loam, and the substratum is friable, massive silt; in places thin layers of fine sand occur in the profile.	4 feet or more	Cambrian sandstone.
MdA MdB MdC2	Medary silt loam, 0 to 2 percent slopes. Medary silt loam, 2 to 6 percent slopes. Medary silt loam, 6 to 12 percent slopes, moderately eroded.	Moderately well drained, silty soils over lacustrine red clay; the surface soil is friable, granular silt loam, the subsoil is firm, subangular blocky silty clay, and the substratum is stratified, firm silty clay.	20 feet or more	(5)
MmA MmB MmB2	Meridian loam, 0 to 2 percent slopes. Meridian loam, 2 to 6 percent slopes. Meridian loam, 6 to 12 percent slopes, moderately eroded.	Well-drained soils that developed on stream terraces in medium and moderately coarse textured outwash 24 to 36 inches thick over sand; the surface soil is very friable, granular loam, the subsoil is friable, subangular blocky sandy loam to loam, and the substratum is stratified, loose sand that contains a few pebbles.	20 feet or more	(5)
MsA MsB MsB2 MsC2	Meridian sandy loam, 0 to 2 percent slopes. Meridian sandy loam, 2 to 6 percent slopes. Meridian sandy loam, 2 to 6 percent slopes, moderately eroded. Meridian sandy loam, 6 to 12 percent slopes, moderately eroded.	Well-drained, moderately coarse textured soils that are 24 to 40 inches thick and overlie sand on stream terraces; the surface soil is very friable, granular sandy loam, the subsoil is friable, blocky loam, and the substratum is loose, single grain fine sand; in places there are thin layers of finer textured material in the substratum.	20 feet or more	(5)
NoD NoE NsD2 NsE2 NsF	Norden fine sandy loam, 12 to 20 percent slopes. Norden fine sandy loam, 20 to 30 percent slopes. Norden fine sandy loam and loam, 12 to 20 percent slopes, moderately eroded. Norden fine sandy loam and loam, 20 to 30 percent slopes, moderately eroded. Norden fine sandy loam and loam, 30 to 45 percent slopes.	Well-drained soils that developed on upland valley slopes in moderately coarse textured material 24 to 40 inches thick over siltstone, sand, and shale; the surface soil is very friable, granular fine sandy loam, the subsoil is friable, subangular blocky sandy loam, and the substratum is disintegrated sandstone, shaly sandstone, and shale.	2 to 4 feet	Franconia sandstone.
Or	Orion silt loam	Somewhat poorly drained, deep, silty alluvial soil on the nearly level flood plains of streams; the surface soil is friable, granular silt loam, the subsoil is friable silt and is underlain by firm, massive, light silty clay loam.	20 feet or more	(5)

See footnotes at end of table.

and estimates of properties significant to engineering—Continued

Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
			Subsoil	Substratum	
		Feet			
Moderate	Intermediate	More than 5	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Neutral.
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Slightly acid to neutral.
Moderately slow to slow.	Intermediate	5 to 10	Very sticky and very plastic.	Very sticky and very plastic.	Slightly acid to strongly acid.
Moderate	Intermediate	More than 5	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Medium acid to strongly acid.
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Medium acid to neutral.
Moderate	High	More than 10	Slightly sticky and slightly plastic.	Slightly sticky and slightly plastic.	Neutral to mildly alkaline.
Moderate	Intermediate	3 to 5	Nonsticky and nonplastic.	Slightly sticky and slightly plastic.	Slightly acid to neutral.

TABLE 5.—*Brief descriptions of the soils of Crawford County*

Map symbol	Soil	Soil description	Depth to bedrock	Geologic formation
Ow	Orion silt loam, poorly drained variant	Poorly drained, deep, silty alluvium on the nearly level flood plains of streams; the surface soil is friable, granular silt loam, and the subsoil is friable, laminated silt loam that is underlain by dark-colored, firm, massive, light silty clay loam.	20 feet or more	(5)
RcA RcB RcC	Richwood silt loam, 0 to 2 percent slopes. Richwood silt loam, 2 to 6 percent slopes. Richwood silt loam, 6 to 12 percent slopes.	Well-drained, deep, silty soil on stream terraces; the surface soil is friable, granular silt loam, the subsoil is firm, subangular blocky, light silty clay loam that is underlain by stratified silt and fine sand at a depth below 42 inches.	20 feet or more	(5)
RoA RoB	Rowley silt loam, 0 to 2 percent slopes. Rowley silt loam, 2 to 6 percent slopes.	Somewhat poorly drained, deep, silty soils on nearly level to gently sloping stream terraces; the surface soil is friable, granular silt loam, and the subsoil is firm, subangular blocky silty clay loam that is underlain by friable, stratified silt and fine sand at a depth below 42 inches.	20 feet or more	(5)
SeB2 SeC2 SeD2	Seaton silt loam, 2 to 6 percent slopes, moderately eroded. Seaton silt loam, 6 to 12 percent slopes, moderately eroded. Seaton silt loam, 12 to 20 percent slopes, moderately eroded.	Well-drained, deep soils on benches; developed in windblown, coarse-textured silt over weathered limestone; the surface soil is very friable, granular, light silt loam, the subsoil is friable, subangular blocky silt loam, and the substratum is very friable very fine sandy loam.	4 feet or more	Prairie du Chien dolomite.
SsA SsB SsB2 SsC SsC2	Sparta loamy fine sand, 0 to 2 percent slopes. Sparta loamy fine sand, 2 to 6 percent slopes. Sparta loamy fine sand, 2 to 6 percent slopes, eroded. Sparta loamy fine sand, 6 to 12 percent slopes. Sparta loamy fine sand, 6 to 12 percent slopes, eroded.	Somewhat excessively drained, deep, sandy soils on stream terraces; the surface soil is very friable loamy fine sand that grades to loose, single grain, stratified sand at a depth of 18 to 30 inches.	20 feet of more	(5)
St	Steep stony and rocky land	Somewhat excessively drained, medium-textured, mixed soil materials on steep valley slopes; has many rock outcrops and scattered boulders.	0 to 5 feet	Cambrian sandstone
Su	Stony colluvial land	Variable soil materials containing many stones; on valley slopes or bottom lands along steep drainageways, in depositional areas, or where water flows from the drainageways.	(6)	(5)
TeA TeB2 TeC2 TeD2	Tell silt loam, 0 to 2 percent slopes. Tell silt loam, 2 to 6 percent slopes, moderately eroded. Tell silt loam, 6 to 12 percent slopes, moderately eroded. Tell silt loam, 12 to 20 percent slopes, moderately eroded.	Well-drained, silty soils, 24 to 40 inches thick, that overlie sandy outwash on stream terraces; the surface soil is friable, granular silt loam, and the subsoil is firm, subangular blocky silty clay loam that is underlain by stratified, loose sand.	20 feet or more	(5)

See footnotes at end of table.

and estimates of properties significant to engineering—Continued

Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
			Subsoil	Substratum	
		Feet			
Moderate	Intermediate	1 to 3	Nonsticky and nonplastic.	Slightly sticky and slightly plastic.	Slightly acid to neutral.
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Medium acid to neutral.
Moderate	Intermediate	2 to 4	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Slightly acid to strongly acid.
Moderate	Intermediate	More than 10	Nonsticky and slightly plastic.	Nonsticky and nonplastic.	Slightly acid to medium acid.
Very rapid	High	More than 5	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Slightly acid to strongly acid.
Moderate	Intermediate	More than 10			Slightly acid to strongly acid.
Moderate	Intermediate	More than 5			
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Slightly acid to strongly acid.

TABLE 5.—*Brief descriptions of the soils of Crawford County*

Map symbol	Soil	Soil description	Depth to bedrock	Geologic formation
Tr	Terrace escarpments, loamy	Well-drained to somewhat excessively drained, strongly sloping to steep loams on stream terraces.	20 feet or more	(5)
Ts	Terrace escarpments, sandy	Excessively drained, sandy soil on terraces; slopes range from 12 to more than 30 percent.	20 feet or more	(5)
TvA TvB	Toddville silt loam, 0 to 2 percent slopes. Toddville silt loam, 2 to 6 percent slopes.	Moderately well drained, deep, silty soils on nearly level to sloping stream terraces; the surface soil is friable, granular silt loam, the subsoil is firm, subangular blocky silty clay loam, and the substratum is friable, massive silt; in places stratified fine sand and silt occur at a depth below 42 inches.	20 feet or more	(5)
Wa	Waukegan loam	Well-drained, silty soils, 24 to 40 inches thick, that developed over sandy outwash on stream terraces; the surface soil is friable, granular silt loam, and the subsoil is firm, subangular blocky silty clay loam that is underlain by stratified, loose sand.	20 feet or more	(5)

[1] The relative classes of soil permeability given refer to estimated rates of movement of water in inches per hour through saturated undisturbed cores under a one-half-inch head of water:

Very slow	Less than 0.05
Slow	0.05 to 0.20
Moderately slow	0.20 to 0.80
Moderate	0.80 to 2.50
Moderately rapid	2.50 to 5.00
Rapid	5.00 to 10.00

[2] The rate of infiltration (engineering application) describes the flow or movement of water through the soil surface into a nonsaturated soil. The terms used to describe the range of values of the infiltration capacity through the profile of bare soils after 1 hour of continuous rainfall are described as follows:

High	0.50+ inches per hour.
Intermediate	0.10 to 0.50+ inches per hour.
Low	Less than 0.10 inch per hour.

and estimates of properties significant to engineering—Continued

Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
			Subsoil	Substratum	
		Feet			
Moderate	Intermediate	More than 10		Nonsticky and nonplastic.	Slightly acid to strongly acid.
Very rapid	High	More than 10	Nonsticky and nonplastic.	Nonsticky and nonplastic.	Slightly acid to strongly acid.
Moderate	Intermediate	5 to 10	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Slightly acid to strongly acid.
Moderate	Intermediate	More than 10	Slightly sticky and slightly plastic.	Nonsticky and nonplastic.	Slightly acid to medium acid.

(The above definition is according to R. E. Horton, Amer. Soc. Civ. Engin. Handb. 1949.)

[3] Refers to both seasonal and relatively stable high water tables. In some soils the water table is fairly constant at a given depth throughout the year; in others, the depth to the water table varies according to seasonal precipitation.

[4] Reaction refers to the acidity or alkalinity of the soil and is expressed in pH—the logarithm of the reciprocal of the H—ion concentration. The following are terms for reaction.

	pH
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8

[5] Not determined or is variable.

TABLE 6.—*Estimated soil*

Soil name [1] and map symbol	Erodibility hazard [2]			Suitability as a source of—	
	Surface layer	Subsoil	Substratum	Topsoil [3]	Sand [4]
Alluvial land, poorly drained (Aa)	Moderate	(9)	Severe	Good	Not suitable
Alluvial land (Ab)	Moderate	(10)	Severe	Good	Not suitable
Arenzville silt loam (Ar)	Moderate	(10)	Moderate	Good	Not suitable
Bertrand silt loam (BeA, BeB, BeB2, BeC2)	Moderate	Moderate	Moderate	Good	Questionable
Boone fine sand (BoD)	Severe	(10)	(10)	Poor	Questionable
Chaseburg silt loam (CaB, CaC)	Moderate	(10)	Moderate	Good	Not suitable
Chelsea fine sand (ChC2, ChD2, ChE2)	Severe	(10)	Severe	Poor	Suitable
Cherty alluvial land (Ct)	Moderate	(10)	Moderate	Fair	Not suitable
Dakota loam (DaA)	Moderate	Slight	Severe	Good	Suitable
Dakota sandy loam (DkA)	Moderate	Moderate	Severe	Fair	Suitable
Downs silt loam (DoB, DoB2, DoC2, DoD2)	Moderate	Moderate	Moderate	Good	Not suitable
Dubuque cherty silt loam (DtC, DtD, DtD2, DtE, DtE2)	Moderate	Slight	Slight	Fair	Not suitable
Dubuque silt loam (DuB2, DuC2, DuD, DuD2, DuE, DuE2, DuF)	Moderate	Slight	Slight	Good	Not suitable
Dubuque silt loam, deep (DvB2, DvC, DvC2, DvD, DvD2, DvE, DvE2).	Moderate	Moderate	Slight	Good	Not suitable
Dubuque soils, (DwC3, DwD3)	Moderate	Slight	Slight	Fair	Not suitable
Dubuque soils, deep (DxD3)	Moderate	Moderate	Slight	Good	Not suitable
Ettrick silt loam (Et)	Moderate	Moderate	Moderate	Good	Not suitable
Fayette silt loam, uplands (FaB, FaB2, FaC, FaC2, FaC3, FaD, FaD2, FaD3, FaE, FaE2, FaE3).	Moderate	Moderate	Moderate	Good	Not suitable
Fayette silt loam, valleys (FvB, FvC2, FvD, FvD2, FvE, FvE2, FvF).	Moderate	Moderate	Moderate	Good	Not suitable
Gale silt loam (GaB2, GaC2, GaD, GaD2, GaE, GaE2)	Moderate	Moderate	Severe	Good	Questionable
Gotham loamy fine sand (GoB, GoB2, GoC, GoC2)	Severe	Moderate	Severe	Poor	Suitable
Gullied land (Gu)	Moderate	Moderate	Severe	Variable	Questionable
Hesch loam (HeD, HeE2)	Moderate	Moderate	Severe	Good	Questionable
Hesch sandy loam (HsD2)	Moderate	Moderate	Severe	Fair	Questionable
Hixton loam (HtC2, HtD, HtD2, HtE, HtE2)	Moderate	Moderate	Severe	Good	Questionable
Hixton sandy loam (HuB, HuC2, HuD, HuD2, HuE, HuE2, HuF)	Severe	Moderate	Severe	Poor	Questionable
Hixton stony loam (HyD, HyE)	Moderate	Moderate	Severe	Fair	Questionable
Jackson silt loam (JaA, JaB, JaB2)	Moderate	Moderate	Moderate	Good	Not suitable
Judson cherty silt loam (JcB, JcC)	Moderate	(10)	Moderate	Good	Not suitable
Judson silt loam (JdB)	Moderate	(10)	Moderate	Good	Not suitable
Lindstrom silt loam (LsB, LsC, LsC2, LsD, LsD2, LsE2)	Moderate	Moderate	Moderate	Good	Not suitable
Medary silt loam (MdA, MdB, MdC2)	Moderate	Slight	Slight	Good	Not suitable
Meridian loam (MmA, MmB, MmB2)	Moderate	Slight	Severe	Good	Suitable
Meridian sandy loam (MsA, MsB, MsB2, MsC2)	Severe	Moderate	Severe	Poor	Suitable
Norden fine sandy loam (NoD, NoE)	Moderate	Moderate	Moderate	Good	Not suitable
Norden fine sandy loam and loam (NsD2, NsE2, NsF)	Moderate	Moderate	Moderate	Good	Not suitable
Orion silt loam (Or)	Moderate	(9)	Moderate	Good	Not suitable
Orion silt loam, poorly drained variant (Ow)	Moderate	(9)	Moderate	Good	Not suitable
Richwood silt loam (RcA, RcB, RcC)	Moderate	Moderate	Moderate	Good	Questionable
Rowley silt loam (RoA, RoB)	Moderate	Moderate	Moderate	Good	Questionable
Seaton silt loam (SeB2, SeC2, SeD2)	Moderate	Moderate	Severe	Good	Questionable
Sparta loamy fine sand (SsA, SsB, SsB2, SsC, SsC2)	Severe	(10)	Severe	Poor	Suitable
Steep stony and rocky land (St)	Moderate	Moderate	Moderate	Variable	Not suitable
Stony colluvial land (Su)	Moderate	(9)	Moderate	Fair	Not suitable
Tell silt loam (TeA, TeB2, TeC2, TeD2)	Moderate	Moderate	Severe	Good	Suitable
Terrace escarpments, loamy (Tr)	Moderate	Moderate	Severe	Good	Suitable
Terrace escarpments, sandy (Ts)	Severe	(10)	Severe	Poor	Suitable
Toddville silt loam (TvA, TvB)	Moderate	Moderate	Moderate	Good	Questionable
Waukegan loam (Wa)	Moderate	Moderate	Severe	Good	Suitable

[1] Consists of soil types and miscellaneous land types mapped in the county; when a mapping unit is made up of two or more soils, the characteristics of both soils should be considered.

[2] The susceptibility of the soil materials to erosion by wind or water after the cover of plants has been removed.

[3] Ratings are for use of the soil on embankments, on cut slopes, and in ditches to promote the growth of vegetation.

[4] Principally, the substratum or underlying material of the soil; does not indicate which deposits are suitable as a source of sand for use in concrete; includes particles that have a diameter ranging from 0.05 to 2.0 mm.

[5] Rating is for use of the soil in embankments or for replacement of unsuitable material. The *in-place* drainage condition of the soil is not considered in these ratings.

properties that affect engineering

Suitability as a source of—Continued			Suitability for—				Remarks
Fill material for earth embankments [5]			Pond sites [6]	Drainage [7]	Irrigation [8]	Terraces or diversions	
Surface soil	Subsoil	Substratum					
Fair	(9)	Fair	Questionable	Surface	(9)	Suitable	Subject to flooding.
Fair	(10)	Fair	Questionable	Surface	Good	Suitable	Subject to flooding.
Fair	(10)	Fair	Questionable	—	Good	Suitable	Subject to flooding.
Fair	Fair	Fair	Questionable	Surface	Good	Suitable	
Good	(10)	(10)	Not suitable	—	Poor	Not suitable	Very droughty.
Fair	(10)	Fair	Questionable	—	Good	Suitable	Subject to flooding.
Good	(10)	Good	Not suitable	—	Poor	Not suitable	Droughty.
Fair	(10)	Fair	Questionable	—	Poor	Suitable	Very cherty and stony.
Good	Good	Good	Not suitable	—	Good	Suitable	
Good	Good	Good	Not suitable	—	Fair	Suitable	Droughty.
Fair	Fair	Fair	Suitable	—	Good	Suitable	
Fair	Poor	Poor	Questionable	—	Fair	Questionable	Many stones and chert.
Fair	Fair	Poor	Questionable	—	Good	Questionable	
Fair	Fair	Poor	Suitable	—	Good	Suitable	
Fair	Poor	Poor	Questionable	—	Fair	Questionable	
Fair	Fair	Poor	Suitable	—	Good	Suitable	
Fair	Fair	Fair	Questionable	Subsurface	Poor	Suitable	Subject to flooding.
Fair	Fair	Fair	Suitable	—	Good	Suitable	
Fair	Fair	Fair	Suitable	—	Good	Suitable	
Fair	Fair	Good	Not suitable	—	Good	Suitable	
Good	Good	Good	Not suitable	—	Fair	Not suitable	Droughty.
Good	Fair	Fair	Questionable	—	Poor	Not suitable	
Good	Good	Good	Not suitable	—	Good	Suitable	
Good	Good	Good	Not suitable	—	Fair	Suitable	Droughty.
Good	Good	Good	Not suitable	—	Good	Suitable	
Good	Good	Good	Not suitable	—	Fair	Suitable	Droughty.
Good	Good	Good	Not suitable	—	Good	Not suitable	Many stones.
Fair	Fair	Fair	Questionable	—	Good	Suitable	
Fair	(10)	Fair	Questionable	—	Good	Suitable	Subject to flooding.
Fair	(10)	Fair	Questionable	—	Good	Suitable	Subject to flooding.
Fair	Fair	Fair	Suitable	—	Good	Suitable	
Fair	Fair	Fair	Questionable	Surface	Fair	Suitable	Tight substratum.
Good	Good	Good	Not suitable	—	Good	Suitable	
Good	Good	Good	Not suitable	—	Fair	Suitable	Droughty.
Fair	Fair	Fair	Questionable	—	Good	Suitable	
Fair	Fair	Fair	Questionable	—	Good	Suitable	
Fair	Fair	Poor	Questionable	Subsurface	(9)	Suitable	Subject to flooding.
Fair	Fair	Poor	Questionable	Subsurface	(9)	Suitable	Subject to flooding.
Fair	Fair	Fair	Questionable	—	Good	Suitable	
Fair	Fair	Fair	Questionable	Subsurface	Fair	Suitable	
Fair	Fair	Fair	Questionable	—	Good	Suitable	
Good	(10)	Good	Not suitable	—	Fair	Not suitable	Droughty.
Fair	Fair	Fair	Questionable	—	(9)	Not suitable	Stony.
Fair	(9)	Fair	Questionable	—	(9)	Questionable	Very stony.
Fair	Fair	Good	Not suitable	—	Good	Suitable	
Good	Good	Good	Not suitable	—	Fair	Not suitable	
Good	Good	Good	Not suitable	—	Poor	Not suitable	Droughty.
Fair	Fair	Fair	Questionable	—	Good	Suitable	
Fair	Fair	Good	Not suitable	—	Good	Suitable	

[6] Refers to the suitability of soil material for construction of ponds for permanent storage of water; the compactability of the soils and the porosity of the underlying material were both considered in this rating; questionable soils should be checked in the field.

[7] Rating concerns suitability for surface and subsurface drainage if drainage is needed; dashes imply drainage is not needed.

[8] Refers to suitability of soils for irrigation, based chiefly on the moisture-holding capacity and rate of infiltration; does not consider the economic feasibility of providing water for irrigation.

[9] Does not apply; soils are wet, exceedingly stony, or steep.

[10] Does not apply; lacks a B horizon, is underlain by bedrock, or is extremely variable.

TABLE 7.—*Engineering test data for soil samples*

Soil type, laboratory number, and location	Depth	Moisture-density: Maximum dry density	Moisture-density: Optimum moisture content	Mechanical analysis, Percent passing sieve: No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)
	Inches	*Lb. per cu. ft.*	*Percent*					
Bertrand silt loam:[4]								
Wis-2-46	0–7				100	97	96	91
Wis-2-49	20–40				100	99	99	96
Wis-2-50	40–54				100	99	98	96
Downs silt loam:[5]								
NE¼NW¼SW¼, sec. 5, T. 13 N., R. 4 W. (modal profile)—								
S33025	0–11	97	21				100	99
S33026	20–31	107	19					100
S33027	41–60	109	19					100
NW¼SE¼SE¼, sec. 4, T. 13 N., R. 4 W. (light-textured B horizon)—								
S33028	0–10	96	23				100	99
S33029	24–34	107	18					100
S33030	48–60	115	15			100	98	94
SW¼NE¼SE¼, sec. 33, T. 14 N., R. 4 W. (light-textured B horizon)—								
S33031	0–11	103	19			100	99	98
S33032	20–29	105	19				100	99
S33033	38–60	119	13		100	99	93	83
Dubuque silt loam:[5]								
NW¼NW¼SW¼, sec. 21, T. 10 N., R. 3 W. (modal profile)—								
S33016	0–5	106	17				100	98
S33017	8–16	106	20		100	99	98	97
S33018	16–23	84	37	60	43	42	41	40
SE¼SE¼NW¼, sec. 29, T. 10 N., R. 3 W. (deep)—								
S33019	0–7	89	26		100	99	98	94
S33020	19–29	106	21		100	99	98	94
S33021	29–44	91	29	89	72	69	65	58
SE¼SE¼NW¼, sec. 9, T. 10 N., R. 3 W. (severely eroded)—								
S33022	0–8	108	18			100	99	96
S33023	12–18	107	19				100	98
S33024	18–36	94	27	87	64	60	55	47
Fayette silt loam:[1]								
S31386	0–11	103	17				100	99
S31387	26–33	105	19					100
S31388	48–60	107	18					100
S31389	0–7	96	21		100	99	98	96
S31390	24–35	108	18		100	99	98	96
S31391	45–50	113	15	100	99	96	91	84
Lindstrom silt loam:[4]								
3230235	0–16				100	96	90	78
3230237	25–40				100	96	91	85
3230238	40–60				100	97	96	89
Meridian sandy loam:[4]								
5574	0–8				100	80	58	30
5576	11–19				100	82	66	45
5578	28–34				100	73	48	9
Richwood silt loam:[4]								
5330	0–8				100	99	99	95
5334	23–30				100	99	99	97
5336	37–60				100	99	99	97

[1] Downs silt loams sampled in Vernon County, Wis., and Fayette silt loams sampled in La Crosse County, Wis.

[2] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (pt. 1, ed. 7): The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes, American Association of State Highway Officials (AASHO) Designation: M 145–49. Classification estimated for the Bertrand, Lindstrom, Meridian, and Richwood soils.

[3] Based on the Unified Soil Classification System, Tech. Memo. No. 3–357, v. 1, Waterways Expt. Sta. Corps of Engin., U.S. Army. March 1953. Classification estimated for the Bertrand, Lindstrom, Meridian, and Richwood soils.

from 12 profiles, Crawford County, Wis.[1]

Mechanical analysis—Continued: Percent smaller than— 0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.	Liquid limit	Plasticity index	Classification: AASHO[2]	Unified[3]
90	50	18	12			A-4	ML-CL.
95	60	37	31			A-7-6	CL.
94	57	33	28			A-7-6	CL.
95	66	31	23	36	9	A-4(8)	ML.
96	64	33	28	38	15	A-6(10)	ML-CL.
97	64	30	25	37	13	A-6(9)	ML-CL.
97	68	32	24	41	12	A-7-6(9)	ML.
97	64	33	27	38	14	A-6(10)	ML-CL.
91	57	23	18	29	9	A-4(8)	CL.
95	65	31	23	35	10	A-4(8)	ML-CL.
96	67	35	29	40	14	A-6(10)	ML-CL.
81	57	27	19	26	8	A-4(8)	CL.
94	60	27	18	31	7	A-4(8)	ML-CL.
95	69	37	29	36	13	A-6(9)	ML-CL.
39	34	31	29	76	39	A-7-5(6)	GM.
91	56	22	11	41	7	A-5(8)	ML.
91	60	34	30	40	18	A-6(11)	CL.
56	50	45	44	64	33	A-7-5(15)	MH-CH.
93	61	30	26	35	12	A-6(9)	ML-CL.
95	83	34	28	40	17	A-6(11)	CL.
46	42	38	36	58	31	A-7-6(10)	SC.
90	58	20	14	29	5	A-4(8)	ML-CL.
97	64	36	30	44	20	A-7-6(13)	CL.
96	60	30	25	38	16	A-6(10)	CL.
94	58	22	15	36	7	A-4(8)	ML.
93	61	32	26	38	16	A-6(10)	CL.
81	52	27	24	34	14	A-6(10)	CL.
69	52	31	25			A-6	CL.
82	55	31	24			A-6	CL.
84	47	23	19			A-6	CL.
29	17	9	6			A-2-4	SM.
43	29	17	11			A-4	SM.
8	5	4	3			A-2-4	SP-SM.
93	50	22	16			A-4	ML-CL.
95	50	31	25			A-6	CL.
93	46	28	23			A-6	CL.

[4] Test data from U.S. Soil Conservation Service (SCS). Soil Mechanics Laboratory, Lincoln, Nebr.

[5] Tests performed by U.S. Bureau of Public Roads in accordance with standard procedures of the AASHO. Mechanical analysis are according to AASHO Designation T 88. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the SCS. In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 mm. in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 mm. in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming the textural classes of soils.

587600—61——5

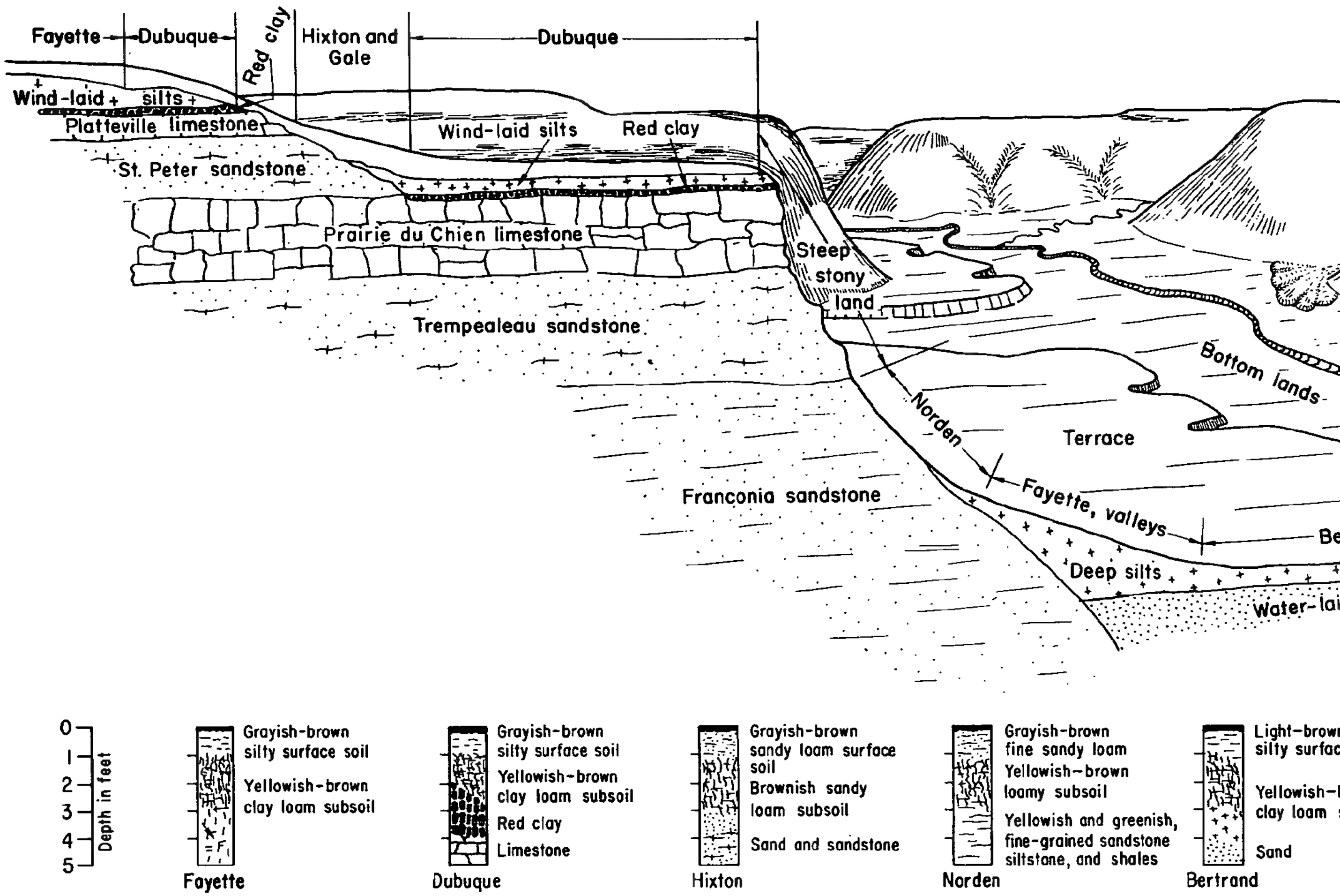

Figure 24.—Landscape of Crawford County showing the parent materials of the soils and relationships among majo

Formation, Classification, and Morphology of the Soils

In this section are discussed the factors that affect soil formation, the morphology and composition of the soils of Crawford County, and the classification of the soils into higher categories. Following this, each soil series in the county is described and a soil profile typical of that series is given.

Factors of Soil Formation

The characteristics of each soil are the result of the combined effects of environment, or of soil-forming factors. These soil-forming factors are (1) the parent material from which the soil originated, (2) the climate under which the soil formed, (3) the kinds of plant and animal life on and in the soil, (4) the relief or lay of the land, and (5) the length of time these forces have had to act upon the parent material. The interaction of all of these factors accounts for differences among the soils of an area, such as a county.

Parent materials

The parent materials from which the soils of Crawford County formed consist of (1) materials derived from the weathering of rocks in place, and (2) materials transported by wind, water, or gravity and laid down as unconsolidated deposits of sand, silt, or clay. The materials derived from the weathering of rocks in place are related directly to the underlying rock from which they originated; the transported materials are related to the soils or rocks from which they were derived. Each soil has formed in one of these two kinds of materials or in a mixture of materials from the two sources.

The parent materials formed in place consist of materials weathered from sedimentary rocks. Because sedimentary rocks differ greatly in chemical and mineralogical composition, the soils formed from them also differ in characteristics.

Much of the bedrock in Crawford County is made up of Ordovician dolomite of the Prairie du Chien formation or of limestones of the Galena, Decorah, and Platteville formations. In the eastern half of the county and in areas near the Mississippi and Wisconsin Rivers, the bedrock is Cambrian sandstone of the Trempealeau and Franconia formations. Sandstone of the St. Peter formation occurs throughout the entire western part of the county, but it is less extensive in the eastern part. Figure 24 shows a landscape of Crawford County and indicates the relationship among soils of the uplands.

The Boone, Hesch, and Hixton soils occur in the part of the county underlain by Trempealeau and St. Peter sandstones, and the Norden soils are underlain by Franconia sandstone. These residual soils developed on steep slopes where transported materials were less likely to be deposited or where transported materials were deposited but were later removed by geologic erosion. Of these soils, the Norden have the strongest slopes.

Transported materials are of three kinds: (1) Windblown silts and very fine sands, or loess, deposited throughout the county in a blanket of variable thickness; (2) water-deposited materials, or alluvium, deposited on stream bottoms and terraces; and (3) colluvium deposited partly by gravity and partly by water, on the foot slopes below steep bluffs.

Figure 25.—**McGregor limestone of the Platteville formation in an old lime quarry; reddish clay, weathered from this limestone, and windblown silt are the parent materials of the Dubuque soils.**

Loess has been deposited throughout the entire county; soils formed wholly or partly from loess overlie all of the geologic formations. The characteristics of a soil formed in loess are determined primarily by the effects of different kinds of vegetation and by the thickness of the deposit. If the mantle of loess is thin, the characteristics of the soil are determined mainly by the kind of underlying material that has weathered from the bedrock. The Dubuque soils, for example, occur in areas where the mantle of loess is thin. They formed partly from loess and partly from the underlying red clay weathered from dolomite (fig. 25). The Downs, Fayette, and Lindstrom soils, on the other hand, formed in areas where the deposit of silt is thicker. Therefore, they developed entirely in loess.

Soils developed in sands and silts deposited by water occur on stream terraces and throughout the flood plains of streams. The characteristics of these soils are determined largely by the thickness and texture of the materials in which they formed, but partly by natural drainage. The Bertrand, Richwood, Dakota, Meridian, Chelsea, and Sparta soils all developed on stream terraces in materials deposited by water. The Bertrand and Richwood soils are silty because they formed in medium-textured materials; the Dakota and Meridian soils are loamy because they formed in loamy materials; and the Chelsea and Sparta soils are sandy because they formed in coarse-textured materials.

The Arenzville, Ettrick, and Orion series consist of silty soils developed on the flood plains of streams (fig. 26). The Chaseburg and Judson soils developed in materials laid down by water or left at the foot of slopes by the force of gravity. These soils are in narrow draws and at the foot of steep slopes.

Soils developed in similar parent materials sometimes differ as the result of differences in relief or drainage. Such soils are called a catena, or chain of soils. For example, the Richwood, Toddville, and Rowley soils have similar parent materials but differ in characteristics

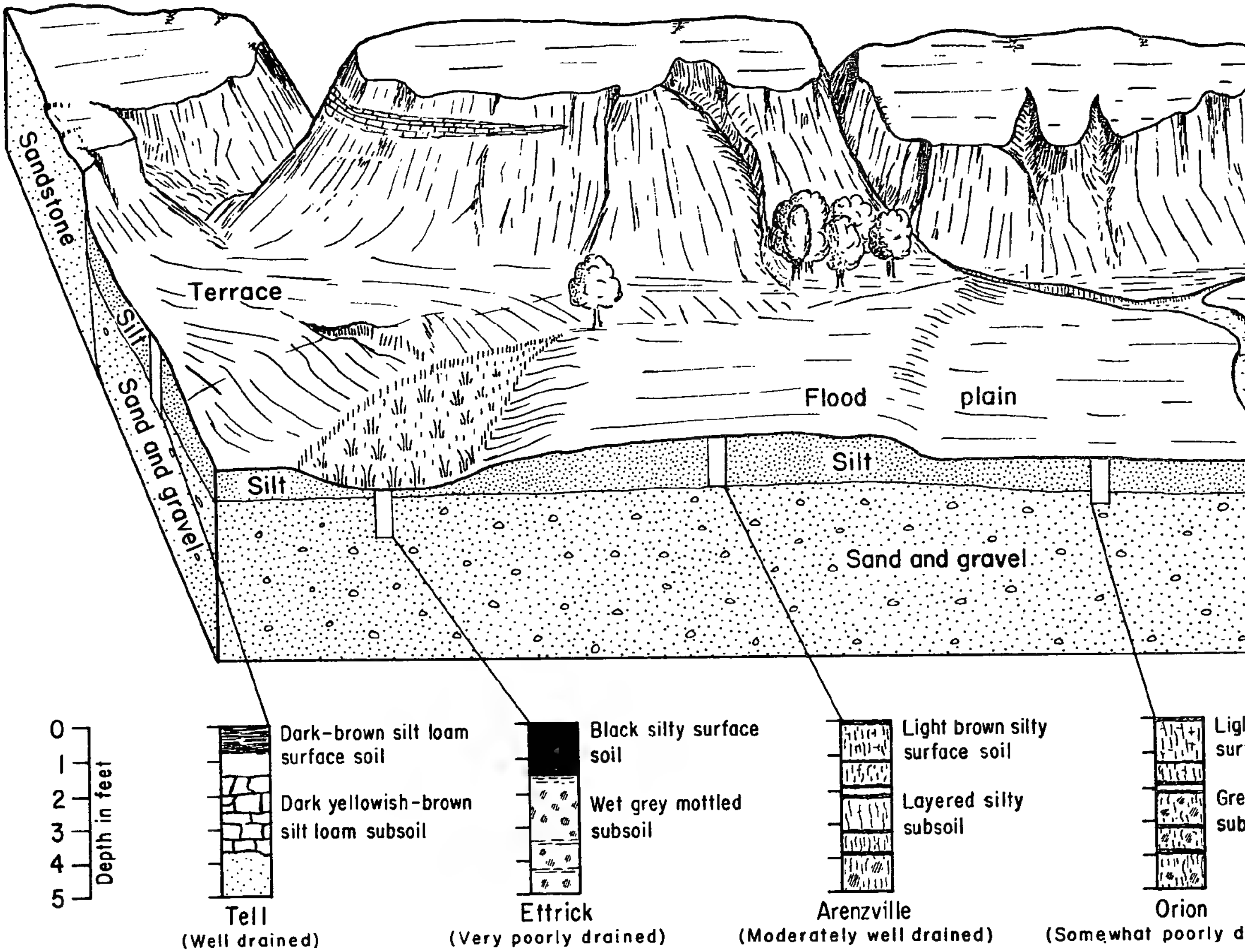

Figure 26.—Landscape showing relationships among soils of the bottom lands of Crawford County.

largely because of differences in drainage. The Richwood soils are well drained, the Toddville are moderately well drained, and the Rowley are somewhat poorly drained. Natural drainage is generally related to the position the soils occupy in the landscape and to the permeability of the subsoil and substratum.

Climate

Climate is an important factor of soil formation. Weathering of the parent material by water and air is activated by changes in temperature. As the result of weathering, changes caused by both physical and chemical actions take place. Water, for example, penetrates the parent material and changes the minerals by freezing and then thawing them. Water also causes chemical changes by dissolving the minerals. Fine particles of minerals are carried with the water as it percolates downward through the soil and are finally redeposited in the lower part of the soil profile.

Weathering, continued over a long period of time, causes characteristic layers, or horizons, to form in the soil materials. Normally, the subsoil in a nearly mature soil is finer textured than the surface layer. This is because fine particles of clay and silt have moved out of the surface layer and have been carried downward through the soil profile by water. They have then been redeposited in the lower part of the solum.

In this county, weathering has been an important factor in the formation of soils because the climate is marked by wide extremes in temperature. Also, a large amount of water, in the form of rain or snow, falls on the soils. The annual rainfall averages about 31 inches, and the average annual snowfall, about 33 inches.

Living organisms

Plants have been the principal living organisms to influence the formation of the soils in this county, but earthworms and other forms of life, in and on the soil, have also contributed. Plants, bacteria, earthworms, and other forms of life add organic matter, or humus, to the soil. Accumulations of humus give the soil a dark color, improve the tilth and moisture-holding capacity, and act as a storage place for plant nutrients.

The kinds of plants a soil will support is determined largely by the parent material and climate. Plants, in turn, modify the soil by adding organic matter, and their roots bring nutrients to the upper part of the profile from the lower horizons. Because grasses have many roots and tops that have decayed on and in the soil, soils formed under prairie have a thick, dark surface layer. In contrast, soils formed under trees have a thinner, lighter colored surface layer because the organic matter, which was derived principally from leaves, was deposited only on the surface of the soil. In this county some of the soils have formed in areas where minor changes in climate have caused the forest to extend into a prairie area or a prairie area to extend into a forested area. The soils in such areas have characteristics of both prairie and forest soils.

Relief

Relief ranges from nearly level to very steep in Crawford County. In some areas, where slopes are steep, a large amount of water runs off the surface. Erosion is rapid and keeps almost even pace with the weathering of rocks and with the formation of soils. As a result, soils on these steep slopes have shallower profiles. On moderately sloping or gently sloping areas, less water runs off and more of it percolates through the soil. As a result, distinct profiles develop in the soils.

In this county most of the soils have slopes that favor development of distinct horizons in the profile. The Fayette soils, which are deep, well drained, and mature, are examples of such soils.

Many nearly level soils are on bottom lands or in depressions where surface runoff and internal drainage are slow and the water table is high. The soils in these low-lying areas differ from well-drained soils in having a wet, mottled, poorly aerated subsoil. The profile in these poorly drained soils is normally not so well developed as the profile in better drained soils.

Time

Most soils in the county have been in place long enough for well-defined horizons to have developed. Some soils, however, are young because they are forming in areas where materials were recently deposited. They have not had time to develop distinct horizons. Other soils are young because they have steep slopes and the soil materials that are deposited wash away before distinct horizons have had time to form.

Classification of Soils

One of the main objectives of a soil survey is to describe and identify the soils and to determine their relationship to agriculture (*8*). A second objective is to group the soils according to the characteristics they have in common. Such a grouping will show the relationship of the soils to one another and to soils of other areas. This is necessary because there are so many different kinds of soil that it would be difficult to remember the characteristics of all of them. If the soils are placed in a few groups, each group having selected characteristics in common, their general characteristics can be remembered more easily.

The lower categories of classification, the soil type and soil series, are defined in the section "Meaning of Technical Terms" at the end of this report. The soil phase, a subdivision of the soil series, is also defined. Soil series are also grouped into higher categories—great soil groups and soil orders. These relationships are shown in table 8. All three soil orders—the zonal, intrazonal, and azonal—are represented in this county.

The zonal order is made up of soils that have well-developed profiles. These soils reflect the predominant influence of climate and living organisms in their formation. In Crawford County the great soil groups of the zonal order are the Gray-Brown Podzolic and the Brunizem (Prairie).

Intrazonal soils have more or less well-defined characteristics that reflect the dominating influence of some local factor, such as relief or parent material, over the effects of climate and living organisms. In this county the only soils in the intrazonal order are those of the Humic Gley great soil group.

TABLE 8.—*Classification of soil series by higher categories*

Great soil group and series	Remarks
ZONAL	
Gray-Brown Podzolic soils:	
Bertrand.	
Downs	Intergrades toward Brunizems.
Dubuque.	
Fayette.	
Gale.	
Hixton.	
Jackson.	
Medary.	
Meridian.	
Norden.	
Seaton.	
Tell.	
Brunizem (Prairie) soils:	
Dakota.	
Gotham	Intergrades toward Gray-Brown Podzolic soils.
Hesch.	
Lindstrom.	
Richwood.	
Rowley	Intergrades toward Humic Gley soils.
Toddville.	
Waukegan.	
INTRAZONAL	
Humic Gley soils:	
Ettrick.	
AZONAL	
Alluvial soils:	
Arenzville.	
Chaseburg	Intergrades toward Gray-Brown Podzolic soils.
Judson	Intergrades toward Brunizems.
Orion.	
Regosols:	
Boone.	
Chelsea	Intergrades toward Gray-Brown Podzolic soils.
Sparta	Intergrades toward Brunizems.

The azonal order is made up of soils that, because of youth, resistant parent material, or relief, lack well-developed profiles. The azonal soils in this county belong to the Alluvial and Regosol great soil groups.

The great soil groups are described in the following pages, and the series in each group are listed. This classification is incomplete and may be revised as knowledge of the soils increases. The soils in several of the soil series are not representative of any one great soil group but intergrade from one great soil group to another. Each series represented in the county is described in the pages following the discussion of the great soil groups. Also described is a representative profile for each series.

Gray-Brown Podzolic soils

Gray-Brown Podzolic soils belong to the zonal order. They have a fairly thin covering of organic matter (A_0) and an organic-mineral (A_1) layer. The organic-mineral layer overlies a grayish-brown, leached A_2 horizon, which, in turn, rests upon a finer textured (illuvial), brown B horizon. In Crawford County the material underlying the Gray-Brown Podzolic soils consists of loessal or alluvial silts, sands, sandstones, or red clay.

These soils formed under deciduous trees in a temperate, moist climate. Podzolization was the chief process in their development. The soil series in this great soil group are:

Bertrand.	**Gale.**	**Meridian.**
Downs.	**Hixton.**	**Norden.**
Dubuque.	**Jackson.**	**Seaton.**
Fayette.	**Medary.**	**Tell.**

The soils of this group occupy most of the acreage in Crawford County. The soils of the Fayette and Dubuque series are more extensive than the soils of the other series.

The Gray-Brown Podzolic soils in the county differ mainly in color and texture and in the development of the soil profile. They also differ in the kind of underlying materials and in the thickness of the solum. The upland soils formed in loess vary as the result of differences in the thickness of the loess. For example, the Fayette and Seaton soils formed in loess that is 42 or more inches thick. Their characteristics differ from those of the Dubuque and Gale soils, which developed in loess that is only 10 to 40 inches thick.

The Fayette soils, typical of the Gray-Brown Podzolic soils in the county, developed in loess of Peorian age. These soils are on upland ridges and on valley slopes below escarpments of Steep stony and rocky land. The slopes range from 2 to 45 percent. The ridge slopes are generally between 12 and 20 percent, however, and the valley slopes are generally between 20 and 30 percent.

The Fayette soils are well drained and have been used extensively for crops. In most places the A_0 horizon and parts of the A_1 and A_2 horizons have been lost through erosion, or plowing has mixed them with material from the subsoil. Consequently, the present surface layer is generally called an A_p' horizon.

The Bertrand, Jackson, and Medary soils are examples of Gray-Brown Podzolic soils formed on terraces. The Bertrand and Jackson soils developed in silty or loamy materials over sand, and the Medary soils, in a thin layer of silt over lacustrine clay.

Brunizems

The Brunizem, or Prairie, soils have formed in a temperate, humid climate under a cover of tall grasses. Typically, Brunizems have a thick, very dark brown to black A horizon and a brownish B horizon that is finer textured than the A. As a rule, their substratum is lighter colored and coarser textured than the A and B horizons. If the soils are cultivated, changes usually occur in the color and thickness of the A horizon. The parent materials of the Brunizem soils in this county are loessal and alluvial silts and sands or materials weathered from sandstone.

In Crawford County the soils in this great soil group are:

Dakota.	**Richwood.**
Gotham.	**Rowley.**
Hesch.	**Toddville.**
Lindstrom.	**Waukegan.**

All of these soils are on terraces or on valley slopes in the uplands. The largest acreage is on the terrace near Prairie du Chien, which is occupied mainly by the Dakota and Waukegan soils. The Dakota and Waukegan soils have developed over sandy outwash and are typical of the Brunizems in this county. The Dakota soils are coarser textured than the Waukegan soils, which overlie sand, but they have a silty surface layer and subsoil.

The Richwood, Toddville, and Rowley are the principal soils in the Citron and Haney Valleys. These soils have formed on terraces in deep deposits of silt. The Richwood and Toddville soils are true Brunizems, but the Rowley intergrade toward soils of the Humic Gley great soil group. The Lindstrom soils have developed in silt and are on valley slopes. The Hesch soils developed in material weathered from sandstone and occur on the south-facing slopes of valleys.

Humic Gley soils

Humic Gley soils belong to the intrazonal order. These soils have formed in depressions, where water tends to accumulate during heavy rains. They have slow to very slow internal drainage. These soils have a thick, dark surface layer that contains a large amount of organic matter. The subsoil is strongly gleyed and is mottled. The soils are generally poorly aerated unless artificial drainage has been provided. In Crawford County only the Ettrick series is in this great soil group.

Alluvial soils

The Alluvial soils belong to the azonal order. These soils are young. They are forming in materials recently deposited on flood plains and on alluvial fans and upland draws. Fresh materials are deposited on these soils when floodwaters are high. As a result, the soil materials have not been in place long enough for their profiles to have distinct horizons. In Crawford County the following soils are in this great soil group:

Arenzville.	Judson.
Chaseburg.	Orion.

The Arenzville and Orion soils are typical of soils in the Alluvial great soil group. The Chaseburg and Judson soils are also in this great soil group, but the Chaseburg soils intergrade toward Gray-Brown Podzolic soils, and the Judson, toward Brunizem soils.

Regosols

Regosols are an azonal group of soils forming in deep, unconsolidated deposits of geological materials. Because of the steepness of slopes or the coarse texture of the parent materials, the soils show little or no horizon development. In this county the following soils are in this group:

Boone.	Sparta.
Chelsea.	

Of these soils, the Boone are the only ones that are typical Regosols. The Boone soils formed over sandstone bedrock and have stronger slopes than the Chelsea and Sparta soils. They generally have a thin, weakly expressed A horizon and lack a B horizon. The Chelsea soils, formed in deep deposits of sand, are intergrading to Gray-Brown Podzolic soils. They have weakly expressed profiles and are droughty. The Sparta soils formed from parent materials similar to those of the Chelsea, but they are intergrading toward the Brunizem soils.

Detailed Descriptions of Soil Series

In this section the soil series in the county are discussed in alphabetical order. In addition, a representative profile of each series is described in detail. The great soil group is given for each series for easy cross reference to table 8.

Arenzville series

The Arenzville soils are deep and silty and are well drained to moderately well drained. They belong to the Alluvial great soil group. These soils are on bottom lands and are likely to be flooded. In many places, however, the risk of flooding is not serious and the areas can be used for crops or pasture.

These soils developed in alluvium washed from the uplands and deposited on bottom lands by flooding. The color, thickness, and number of horizons in the soil profile vary, depending upon the rate and amount of deposition. There is generally some mottling in the lower part of the profile. The soils are mildly alkaline. In many places, at a depth of 1½ to 4 feet, they overlie an old, buried soil. The soils are associated with the Orion soils, which are somewhat poorly drained.

The following describes a profile of an Arenzville silt loam:

A_{11} 0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam with very thin seams of fine sand; weak to moderate, thin, platy structure; very friable; some mixing by earthworms; many roots; mildly alkaline; gradual, wavy boundary.

A_{12} 9 to 25 inches, dark grayish-brown (10YR 4/2) silt loam; stratified in places with thin seams of fine sand; weak, thin, platy structure; very friable when moist; many roots; slightly vesicular; mildly alkaline; abrupt, smooth boundary.

A_{13} 25 to 31 inches, very dark gray (10YR 3/1) silt loam; weak, thin, platy structure; very friable; slightly vesicular; a few roots; mildly alkaline; abrupt, smooth boundary.

A_{1b} 31 to 46 inches, black (10YR 2/1) silt loam; weak, fine to medium, granular structure; friable; a few roots; slightly vesicular; mildly alkaline; gradual, wavy boundary.

A_{3b} 46 to 54 inches, very dark gray to black (10YR 3/1 to 2/1) silt loam; weak to moderate, fine, granular structure; friable; slightly vesicular; neutral; gradual, wavy boundary.

B_{1b} 54 to 61 inches, very dark grayish-brown (10YR 3/2), light silty clay loam; moderate, medium, subangular blocky structure; friable; slightly vesicular; neutral; gradual, wavy boundary.

B_{2b} 61 inches +, very dark grayish-brown (10YR 3/2) silty clay loam; common, faint, brown (10YR 5/3) mottles; moderate, medium, subangular blocky structure; friable; slightly vesicular; neutral.

Bertrand series

The Bertrand series is made up of deep, silty, well-drained soils that belong to the Gray-Brown Podzolic great soil group. The soils have developed in silt on high to medium stream terraces. They are used mainly for crops, and, under good management, are highly productive.

The Bertrand soils are associated with the Jackson soils, which are moderately well drained. In texture they are similar to the Richwood soils, but they have formed under a mixed stand of hardwood trees rather than under prairie grasses, and they have a thinner, lighter colored A horizon.

The depth of silty material in the Bertrand soils ranges from 42 inches to several feet. The color of the surface layer ranges from dark grayish brown to very dark grayish brown (10YR 4/2 to 3/2), depending upon the content of organic matter. The thickness of the solum ranges from 36 to 48 inches.

The following describes a profile of a Bertrand silt loam:

A_p 0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, very thick, platy structure that breaks to moderate, fine, subangular blocks; friable; many roots and pores; slightly acid; abrupt smooth boundary.

B_1 7 to 14 inches, dark-brown to brown (10YR 4/3), heavy silt loam; faces of peds are dark yellowish brown (10YR 4/4); moderate, medium, subangular blocky structure; friable when moist, but slightly hard when dry; many roots; medium acid; gradual, smooth boundary.

B_{21} 14 to 22 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/4), light silty clay loam; faces of peds are brown (10YR 5/3); moderate to strong, medium, subangular blocky structure; firm to friable when moist, but hard when dry; many fine roots; medium acid; gradual smooth boundary.

B_{22} 22 to 29 inches, yellowish-brown (10YR 5/4) to dark yellowish-brown (10YR 4/4) silty clay loam; faces of peds are dark brown (10YR 4/3); moderate, coarse, subangular blocky structure that breaks readily to moderate to strong, fine to medium, subangular blocks; firm when moist, but hard when dry; many fine roots and old root channels; strongly acid; gradual, smooth boundary.

B_3 29 to 38 inches, yellowish-brown (10YR 5/4) to brownish-yellow (10YR 6/6), light silty clay loam; massive; friable when moist, but slightly hard when dry; a few fine roots; vesicular; clay skins on peds and on the sides of the surrounding root channels; medium acid; gradual, smooth boundary.

C_1 38 to 47 inches, yellowish-brown (10YR 5/4) to brownish-yellow (10YR 6/6) silt loam with light-gray (10YR 7/2) spots; massive; friable when moist; a few fine roots; medium acid; abrupt, smooth boundary.

C_2 47 to 64 inches, grayish-brown (2.5Y 5/2) to light brownish-gray (2.5Y 6/2) silty clay loam; massive; slightly plastic when wet, but hard when dry; common, medium, distinct mottles; roots absent; medium acid.

Boone series

The Boone series is made up of excessively drained soils that belong to the Regosol great soil group. The soils have formed in materials from sandstone. They are on the steeper slopes, immediately below bedrock escarpments.

These soils are low in moisture-holding capacity, and their natural fertility is low. They are subject to severe erosion.

The Boone soils are similar to the Hixton soils. They lack a textural B horizon, however, and they also have a coarser textured solum. Depth to bedrock varies.

The following describes a profile of a Boone fine sand in a pastured woodlot that has a slope of 30 percent:

A_1 0 to 4 inches, very dark grayish-brown (2.5Y 3/2) fine sand; single grain; loose; many roots; strongly acid; clear, smooth boundary.

A_3 4 to 10 inches, yellowish-brown to dark yellowish-brown (10YR 5/4 to 4/4) sand; single grain; loose; many roots; strongly acid; clear, smooth boundary.

C_1 10 to 15 inches, light brownish-gray (2.5Y 6/2) sand; single grain; loose; a few roots; strongly acid; clear, smooth boundary.

C_2 15 to 25 inches, light yellowish-brown (10YR 6/4) sand; single grain; loose; a few roots; medium acid; clear, smooth boundary.

D_r 25 inches +, pale-yellow (2.5Y 7/4) and white (2.5Y 8/2), banded sandstone bedrock; medium acid.

Chaseburg series

The Chaseburg series consists of deep, silty soils that are well drained to moderately well drained. The soils belong to the Alluvial great soil group. They have developed in silty alluvial materials. These silty materials were washed from the uplands and were deposited in draws or on foot slopes by runoff or by soil creep. The soils occur throughout the county but are generally in small areas. They have a weakly developed profile. The hazard of flooding is slight to severe.

These soils are lighter colored than the Judson soils, which occur in similar positions. There are minor variations in the color of the soils, depending upon the kind of sediments in which they formed.

The following describes a profile of a Chaseburg silt loam:

A_1 0 to 10 inches, very dark grayish-brown to brown (10YR 3/2 to 5/3) silt loam, pale brown (10YR 6/3) when dry; moderate, thin, platy structure; friable when moist; many roots and pores; neutral; clear, wavy boundary.

C_1 10 to 35 inches, dark grayish-brown to brown (10YR 4/2 to 5/3) silt loam; a few fine, faint mottles of dark brown (7.5YR 4/4); weak to moderate, medium, platy structure; friable when moist; many roots and pores; slightly acid; clear, wavy boundary.

C_2 35 to 60 inches, dark grayish-brown (10YR 4/2) silt loam; structureless; friable when moist; a few fine roots; many pores; medium acid.

Chelsea series

The Chelsea soils are deep and sandy and are excessively drained. They are Regosols that are intergrading to the Gray-Brown Podzolic great soil group. The soils have developed in fine sand laid down by wind. They occur on high stream terraces and on valley slopes. In many places these soils have bands of sandy loam or loam at a depth of 42 inches or more.

The following describes a profile of a Chelsea fine sand:

A_p 0 to 9 inches, dark gray to very dark gray (10YR 4/1 to 3/1) fine sand; single grain; loose; many roots; medium acid; gradual, smooth boundary.

A_3 9 to 16 inches, dark grayish-brown to very dark grayish-brown (10YR 4/2 to 3/2) fine sand; single grain; loose; many roots; medium acid; gradual, smooth boundary.

C_1 16 to 24 inches, dark-brown to brown (10YR 3/3 to 5/3) fine sand; single grain; loose; many roots; medium acid; gradual, smooth boundary.

C_2 24 to 42 inches, dark yellowish-brown (10YR 4/4) fine sand; single grain; loose; a few roots; strongly acid; abrupt, smooth boundary.

C_3 42 to 52 inches, dark-brown (7.5YR 4/4) sandy loam band; massive; very friable; very few roots; strongly acid; abrupt, smooth boundary.

C_4 52 to 72 inches, brown (7.5YR 5/4) fine sand; single grain; loose; interspersed with bands of dark reddish-brown (5YR 3/4) loam that are 4 to 10 inches thick; massive; very friable; medium acid.

Dakota series

The Dakota soils are moderately deep and are well drained. They belong to the Brunizem (Prairie) great soil group. These soils are mainly on terraces near Prairie du Chien. They have developed in sandy or loamy outwash. In most places the B horizons are slightly finer textured and more compact than the A horizons. Loose sand generally occurs at a depth below 24 to 36 inches, but in a few places depth to the sand is less than 24 inches.

These soils are similar to the Meridian and Waukegan soils, but they have thicker, darker colored A horizons than the Meridian soils and are more sandy or loamy throughout than the Waukegan.

The following describes a profile of a Dakota sandy loam:

A_1 0 to 11 inches, black to very dark brown (10YR 2/1 to 2/2) sandy loam; weak, medium, granular structure; very friable; many roots and pores; medium acid; gradual, smooth boundary.

A_3 11 to 15 inches, dark-brown (7.5YR 3/2 to 3/3) sandy loam; weak, medium, subangular blocky structure; friable; many roots and pores; medium acid; gradual, wavy boundary.

B_{21} 15 to 21 inches, dark-brown (7.5YR 3/3) loam; moderate, medium, subangular blocky structure; friable; in places contains a few, fine pebbles; many roots and pores; strongly acid; gradual, smooth boundary.

B_{22} 21 to 26 inches, dark-brown (7.5YR 3/2) sandy loam; weak, coarse, subangular blocky structure; very friable; many fine roots and pores; medium acid; abrupt, smooth boundary.

B_3 26 to 33 inches, dark-brown (7.5YR 3/4) loamy sand; slightly compact in place; structureless; loose when dry; medium acid; gradual, wavy boundary.

C 33 to 60 inches, yellowish-brown (10YR 5/4) sand; loose; single grain; a few scattered pebbles; slightly acid; several feet thick.

Downs series

The Downs soils are deep and silty and are well drained. They are Gray-Brown Podzolic soils but are intergrading to Brunizems. The soils are mainly near Mt. Sterling and Fairview along the crests of the main ridges. They have developed in loess of Peorian age.

These soils have a thicker, darker colored A_1 horizon than the Fayette soils with which they are associated. Also, their A_2 horizon is not so well developed and their B horizon is browner.

The following describes a profile of a Downs silt loam:

A_p 0 to 6 inches, very dark grayish-brown (10YR 3/2, dry) to very dark gray (10YR 3/1, moist) silt loam; moderate, medium, granular structure; very friable; many roots; much worm activity; mildly alkaline.

A_1 6 to 11 inches, very dark gray (10YR 3/1, dry) to black (10YR 2/1, moist) silt loam; moderate, medium to coarse, granular structure; very friable; many roots; much worm activity; mildly alkaline.

A_2 11 to 14 inches, very dark grayish-brown (10YR 3/2, moist) silt loam; very weak, medium, platy structure; very friable; slightly vesicular; many roots; a few wormholes; slightly acid.

B_1 14 to 20 inches, dark-brown (10YR 3/3, moist), heavy silt loam; weak to moderate, fine to medium, subangular blocky structure; friable; slightly vesicular; aggregates have light-colored silica coatings; many roots; a few wormholes; medium acid.

B_2 20 to 30 inches, dark-brown (10YR 3/3, moist) silty clay loam; moderate, medium, subangular blocky structure; firm, slightly vesicular; aggregates have light-colored silica coatings; many roots; a few wormholes; medium acid.

B_3 30 to 41 inches, brown (10YR 5/3, moist), heavy silt loam; weak, medium, subangular blocky structure; friable; slightly vesicular; aggregates have light-colored silica coatings; many roots; a few wormholes; medium acid.

C 41 to 60 inches, brown (10YR 5/3) silt loam; massive; friable; a few roots; medium acid.

Dubuque series

The Dubuque soils are silty and are well drained. They occur throughout the county on upland ridges. These soils belong to the Gray-Brown Podzolic great soil group. They have developed partly in loess that is 10 to 40 inches thick and partly in red clay. The clay is cherty and has weathered from dolomitic limestone of the Prairie du Chien and Platteville formations. In some places the Platteville limestone is thin, or has disintegrated, and the red clay rests on Glenwood shale, which is mildly alkaline.

The soils occur in association with the Fayette soils. The shallower Dubuque soils are mainly on the steeper slopes and on the narrower ridgetops where the mantle of loess is thinnest. The deep Dubuque soils and the Fayette soils are near the crests of the ridges where the deposit of loess is thickest. The thickness of loess in the shallower soils is 10 to 20 inches over red clay, but the thickness of loess in the deep Dubuque soils is 20 to 40 inches over clay.

The main differences among the soils of the Dubuque series are related to the depth to the underlying red clay, to the amount of chert in the profile, and to the thickness of the red clay over dolomite.

Two profiles of Dubuque silt loam are described. The first is a profile of a Dubuque silt loam, and the second is a profile of a Dubuque silt loam, deep.

Dubuque silt loam:

A_1 0 to 4 inches, dark grayish-brown (10YR 4/2, moist) or grayish-brown (10YR 5/2, dry) silt loam; moderate, medium, granular structure; friable; many roots; medium acid; clear, wavy boundary.

A_2 4 to 9 inches, grayish-brown (10YR 5/2, moist) or gray (10YR 6/1, dry) silt loam; moderate, thin, platy structure; friable; moderate silica coatings on peds; a few wormholes and wormcasts; roots plentiful; medium acid; gradual, wavy boundary.

B_1 9 to 15 inches, dark yellowish-brown (10YR 4/4, moist) or yellowish-brown (10YR 5/4, dry), heavy silt loam; moderate, fine, subangular blocky structure; friable; roots plentiful; slightly vesicular; silica coatings on surfaces of peds; strongly acid; clear wavy boundary.

B_{21} 15 to 23 inches, dark-brown (7.5YR 4/4, moist) to reddish-brown (5YR 4/4, moist) silty clay loam; moderate, medium, subangular blocky structure; firm; roots plentiful; prominent silica coatings on surfaces of peds; a few small fragments of chert in lower part; some stains of organic matter and clay films on peds; strongly acid; clear, wavy boundary.

B_{22} 23 to 30 inches, reddish-brown to yellowish-red (5YR 4/4 to 4/6, moist) clay; strong, medium, angular blocky structure; sticky when wet, very hard when dry; a few roots in lower part; clay films and stains of organic matter prominent; many angular fragments of chert; strongly acid; 6 to 12 inches thick; gradual, wavy boundary.

C 30 inches +, brownish-yellow (10YR 6/6, moist) and red (2.5YR 4/8, moist) clay; strong, medium, angular blocky structure; sticky when wet, very hard when dry; fragments of chert plentiful; strongly acid.

Dubuque silt loam, deep:

A_1 0 to 5 inches, very dark grayish-brown (10YR 3/2, moist) or dark grayish-brown (10YR 4/2, dry) silt loam;

moderate, fine, granular structure; friable; roots and earthworm casts plentiful; medium acid; clear, wavy boundary.

A_2 5 to 12 inches, dark grayish-brown (10YR 4/2, moist) or gray (10YR 5/1, dry) silt loam; moderate, medium, platy structure; friable; roots plentiful; light-gray silica coatings on peds; slightly vesicular with many earthworm holes and a few casts; strongly acid; gradual, smooth boundary.

B_1 12 to 18 inches, dark yellowish-brown (10YR 4/4, moist) or yellowish-brown (10YR 5/4, dry), light silty clay loam; moderate, fine, subangular blocky structure; friable when moist, slightly hard when dry; roots plentiful; prominent silica coatings and a few thin clay films on peds; strongly acid; gradual, wavy boundary.

B_{21} 18 to 30 inches, dark yellowish-brown (10YR 4/4, moist) silty clay loam; moderate, medium, subangular blocky structure; slightly sticky when wet, very hard when dry; roots plentiful; prominent silica coatings and clay films on surfaces of peds; a few fragments of chert in lower part; strongly acid; gradual, smooth boundary.

B_{22} 30 to 37 inches, reddish-brown (5YR 4/4, moist), gritty silty clay; strong, fine to medium, angular blocky structure; very hard when dry; sticky when wet; prominent clay films and stains of organic matter on surfaces of peds; roots concentrated in vertical structural cracks; strongly acid; gradual, wavy boundary.

C 37 inches +, reddish-brown to brownish-yellow (5YR 4/4 to 10YR 6/6, moist) clay to sandy clay; moderate, medium, angular blocky structure; hard when dry, sticky when wet; a few roots and many fragments of chert; strongly acid.

Ettrick series

The Ettrick soils are poorly drained. They are on high bottoms along streams where they are likely to be flooded occasionally. These soils belong to the Humic Gley great soil group. They have developed in deep deposits of alluvium under vegetation that tolerates water. The dark color of the surface layer was probably caused by decaying vegetation. The grayish, mottled color of the subsoil is the result of poor aeration caused by poor drainage.

The following describes a profile of an Ettrick silt loam:

A_p 0 to 7 inches, black (10YR 2/1) silt loam; weak to moderate, fine to medium, granular structure; friable; many roots; some worm activity; neutral; clear, wavy boundary.

A_{12} 7 to 11 inches, very dark gray (10YR 3/1) silty clay loam; a few, fine, distinct mottles of dark gray and dark grayish brown (10YR 4/1 and 4/2); weak to moderate, fine, subangular blocky structure; friable; many roots; some worm activity; neutral; clear, wavy boundary.

A_3 11 to 15 inches, dark-gray (10YR 4/1) silty clay loam; common, medium, distinct mottles of brown (10YR 5/3); weak, fine, subangular blocky structure; plastic; many roots; some worm activity; neutral; clear, wavy boundary.

B_{1g} 15 to 26 inches, grayish-brown (2.5Y 5/2) silty clay loam; many, medium, distinct mottles of light olive brown (2.5Y 5/6); weak, fine, subangular blocky structure; plastic; many roots; neutral; clear, wavy boundary.

G_1 26 to 36 inches, light brownish-gray (2.5Y 6/2) silty clay loam; few, fine, distinct mottles of light olive brown and olive brown (2.5Y 5/6 and 4/4); massive; plastic; a few roots; neutral; gradual, wavy boundary.

G_2 36 inches +, light brownish-gray (2.5Y 6/2) silt loam; many, prominent, yellowish-brown (10YR 5/8) mottles in planes or layers; dark reddish-brown (5YR 2/2) manganese concretions are common; massive; friable; mildly alkaline.

Fayette series

The Fayette soils are deep and silty and are well drained. They belong to the Gray-Brown Podzolic great soil group. The soils occur on uplands on the crests of broad, rounded ridges underlain by dolomite and on the slopes of valleys. They formed under a cover of deciduous trees from loess of Peorian age. The Fayette soils are similar to the Dubuque soils, but the Dubuque soils formed partly in the red clay underlying the loess. In contrast to the Downs soils, the Fayette soils in virgin areas have a strong A_2 horizon. The Fayette soils are extensive in this county and are generally highly productive.

In areas that have been cultivated, these soils generally lack an A_2 horizon. The upland Fayette soils in this county vary chiefly in the amount of mottling in the C_1 horizon. They also vary in the size of the silt particles that make up the loessal parent material. The valley Fayette soils differ from these upland soils in having a B_2 horizon of heavy silt loam that has weak to moderate structure. In some areas the texture of the surface layer is heavy loam and the surface layer contains fragments of weathered sandstone.

The following describes a profile of a Fayette silt loam:

A_{00} ½ to 0 inch of partly decomposed hardwood leaves; abrupt, wavy boundary.

A_1 0 to 7 inches, very dark gray (10YR 3/1) silt loam; moderate, medium, granular structure but also contains a few, very weak, thin plates; friable; many roots and pores; medium acid; clear, wavy boundary.

A_2 7 to 12 inches, dark grayish-brown (10YR 4/2) silt loam; faces of peds are brown (10YR 5/3); moderate, medium, platy structure; friable; vesicular; very strongly acid; abrupt, wavy boundary.

A_3 12 to 19 inches, brown (10YR 5/3 to 4/3) silt loam; weak, medium, subangular blocky structure that breaks to weak, medium plates; friable; vesicular; strongly acid; abrupt, wavy boundary.

B_1 19 to 24 inches, brown (10YR 4/3), heavy silt loam; moderate, coarse to medium, subangular blocky structure; firm; many roots; strongly acid; clear, wavy boundary.

B_2 24 to 35 inches, brown (7.5YR 4/4 to 5/4) silty clay loam; faces of peds very dark grayish brown to dark brown (10YR 3/2 to 3/3); moderate to strong, medium to fine, subangular blocky structure; firm; strongly acid; 7 to 14 inches thick; clear, wavy boundary.

B_3 35 to 45 inches, yellowish-brown (10YR 5/4), heavy silt loam; faces of peds pale brown (10YR 6/3); moderate, coarse to medium, subangular blocky structure; firm; strongly acid; clear, wavy boundary.

C 45 inches +, yellowish-brown (10YR 5/4) silt loam; very weak, coarse, angular blocky structure; firm; a few pores; medium acid.

Gale series

The Gale series consists of well-drained soils that belong to the Gray-Brown Podzolic great soil group. They are on valley slopes between the Fayette soils on ridgetops and soils of the bottom lands. The slopes are generally convex. They range from 2 to 25 percent but are predominantly between 12 and 20 percent. The soils developed in loess of Peorian age. The loess is 24 to 40 inches thick and overlies sandstone bedrock.

The Gale soils are similar to the Norden soils, but their substratum is lighter colored and coarser textured than that of the Norden soils. The Gale soils differ from the

Hixton soils in having a surface layer of silt loam, rather than one of loam or sandy loam. They also have a B horizon that is better developed and finer textured than that of the Hixton soils. In some areas fragments of sandstone, limestone, and chert are scattered throughout the solum.

The following describes a profile of a Gale silt loam:

A_p 0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, subangular blocky structure that breaks to moderate, fine granules; friable; many plant roots; medium acid; abrupt, smooth boundary.

A_2 7 to 13 inches, brown to dark-brown (10YR 5/3 to 4/3) silt loam; moderate, thin to medium, platy structure; friable; many plant roots; medium acid; clear, wavy boundary.

B_1 13 to 18 inches, dark-brown (10YR 4/3), heavy silt loam; weak to moderate, medium, subangular blocky structure; friable; many roots; a few grayish-brown (10YR 5/2) coatings of silica on the surfaces of peds; medium acid; clear, wavy boundary.

B_2 18 to 28 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine to medium, subangular blocky structure; firm; many roots; light brownish-gray (10YR 6/2) coatings of silica on the surfaces of peds; strongly acid; clear, wavy boundary.

D_1 28 to 36 inches, brown (7.5YR 5/4) medium sand; single grain; loose; a few small fragments of sandstone at a depth below 30 inches; strongly acid; gradual, wavy boundary.

D_2 36 inches +, strong-brown (7.5YR 5/8) and pink (7.5YR 7/4), partly weathered sandstone; strongly acid.

Gotham series

The Gotham soils are sandy and are somewhat excessively drained. They are Brunizem (Prairie) soils that are intergrading to Gray-Brown Podzolic soils. These soils developed on medium terraces throughout the county.

The Gotham soils are associated with Sparta and Meridian soils. They differ from the Sparta soils in having a weakly developed B horizon. The Gotham soils have a darker colored, coarser textured surface layer than the Meridian soils, and their B horizon is coarser textured.

The following describes a profile of a moderately eroded Gotham loamy fine sand observed in Crawford County:

A_p 0 to 6 inches, very dark grayish-brown (10YR 3/2, dry) to very dark brown (10YR 2/2, moist) loamy fine sand; weak, fine, granular structure; very friable; many roots; neutral; clear, smooth boundary.

A_3 6 to 9 inches, brown (10YR 5/3, dry) to dark-brown (10YR 3/3, moist), light sandy loam; weak, fine, granular structure; very friable; many roots; neutral; clear, smooth boundary.

B_2 9 to 16 inches, brown (10YR 4/3, dry) to dark-brown (10YR 3/3, moist) sandy loam; massive; very friable; many roots; strongly acid; clear, smooth boundary.

B_3 16 to 33 inches, reddish-yellow or strong-brown (7.5YR 6/6 or 5/6, dry) to strong-brown or brown (7.5YR 5/6 or 5/4, moist) loamy sand; single grain; loose; strongly acid; gradual, wavy boundary.

C 33 to 50 inches, yellowish-brown to dark yellowish-brown (10YR 5/4 to 4/4, moist) fine sand; single grain; loose; has reddish-brown (5YR 4/3) bands of sandy loam that are one-fourth inch wide and are spaced 1 to 5 inches apart; compact in place; strongly acid.

Hesch series

The Hesch series consists of moderately deep soils that are well drained. They belong to the Brunizem (Prairie) great soil group. The soils developed from materials weathered from sandstone, under prairie vegetation.

These soils have a mixed texture that ranges from sandy to silty. Generally, fragments of sandstone occur throughout the profile. Depth to bedrock is 36 to 60 inches. In some places silty and sandy sediments are in strata of varying thickness, and in other places the silty and sandy sediments occur throughout the profile.

The following describes a profile of a Hesch sandy loam:

A_p 0 to 8 inches, very dark gray (10YR 3/1) to very dark brown (10YR 2/2) sandy loam; weak, fine, granular structure; very friable; many roots; slightly acid; gradual, wavy boundary.

A_3 8 to 14 inches, very dark brown (10YR 2/2) to very dark grayish-brown (10YR 3/2) sandy loam; moderate, fine to medium, granular structure; friable; many roots; medium acid; clear, smooth boundary.

B_1 14 to 20 inches, dark-brown (7.5YR 3/2 to 3/4), heavy sandy loam; weak, coarse, subangular blocky structure; friable; many roots; slightly vesicular; medium acid; gradual, wavy boundary.

B_2 20 to 30 inches, dark-brown (7.5YR 3/4 and 4/4) loam; weak, coarse, subangular blocky structure; friable; many roots; slightly vesicular; strongly acid; gradual, wavy boundary.

B_3 30 to 36 inches, dark-brown (7.5YR 4/4) sandy loam; weak, coarse, subangular blocky structure; friable; a few roots; medium acid; clear, smooth boundary.

C 36 inches +, brown (10YR 5/3) fine sand; single grain; loose; grades to sandstone bedrock at a depth of 40 inches; medium acid.

Hixton series

The Hixton series consists of moderately deep, well-drained, sandy and loamy soils of uplands. The soils belong to the Gray-Brown Podzolic great soil group. They have developed under forest in material weathered from fine-grained to medium-grained sandstone.

The Hixton soils are associated with Gale and Hesch soils. All of these soils formed over similar materials, but the Hesch soils developed under prairie, and the Gale soils developed in a layer of loess that covered the sandstone.

The Hesch soils differ mainly in the color and texture of the surface layer and subsoil and in depth over sandstone.

The following describes a profile of a Hixton sandy loam:

A_1 0 to 2 inches, dark gray (10YR 4/1, dry) to very dark gray (10YR 3/1, moist) sandy loam; weak, fine, granular structure; very friable; many roots; mildly alkaline; clear, smooth boundary.

A_2 2 to 8 inches, grayish-brown (10YR 5/2, dry) to dark grayish-brown (10YR 4/2, moist) sandy loam; weak, thin, platy structure; very friable; a few fragments of sandstone; slightly vesicular; many roots; mildly alkaline; gradual, wavy boundary.

B_1 8 to 16 inches, light yellowish-brown (10YR 6/4, dry) to dark-brown (10YR 4/3, moist) sandy loam; weak, fine to medium, subangular blocky structure; friable; a few fragments of sandstone; many roots; mildly alkaline; clear, smooth boundary.

B_2 16 to 24 inches, strong-brown (7.5YR 5/6, dry) to dark-brown (7.5YR 4/4, moist) loam; moderate, medium, subangular blocky structure; friable; a few fragments of sandstone; many roots; strongly acid; clear, smooth boundary.

B_3 24 to 32 inches, strong-brown (7.5YR 5/6, moist), heavy sandy loam; compact in place; friable; a few fragments of sandstone; many roots; very strongly acid; clear, smooth boundary.

C 32 to 42 inches, reddish-yellow (7.5YR 6/6, dry) to strong-brown (7.5YR 5/6, moist) fine to medium sand; single grain; loose; has bands of yellowish-red (5YR

5/8, dry, to 5YR 4/8, moist) sandy loam, 2 inches wide, that are compact in place; very strongly acid; clear, smooth boundary.

D_r 42 inches +, very pale brown (10YR 7/4) sandstone with color bands of strong brown (7.5YR 5/6); medium grain; very strongly acid.

Jackson series

The Jackson soils are deep and silty and are moderately well drained. They belong to the Gray-Brown Podzolic great soil group. These soils are nearly level to gently sloping and developed in silty materials on stream terraces.

The Jackson soils are closely associated with the Bertrand soils, which are well drained. They are similar to the Toddville soils, but they have a lighter colored and thinner A horizon. The profile of the Jackson soils is fairly uniform, but it varies in thickness and in the number of mottles.

The following describes a profile of a Jackson silt loam:

A_p 0 to 7 inches, grayish-brown (10YR 5/2, dry) to very dark grayish-brown (10YR 3/2, moist) silt loam; moderate, medium, granular structure; friable; many roots; mildly alkaline; abrupt, smooth boundary.

A_2 7 to 9 inches, grayish-brown (10YR 5/2, dry) to dark grayish-brown (10YR 4/2, moist) silt loam; moderate, thin to medium, platy structure; friable; many roots; neutral; clear, smooth boundary.

A_3 9 to 14 inches, pale-brown (10YR 6/3, dry) to brown (10YR 5/3, moist) silt loam; moderate, fine subangular blocky structure; friable; slightly vesicular; many roots; slightly acid; clear, smooth boundary.

B_1 14 to 19 inches, brown (10YR 5/3, dry) to dark-brown (10YR 4/3, moist), light silty clay loam; strong, medium, subangular blocky structure; firm; slightly vesicular; has slight silica coatings on peds; many roots; medium acid; clear, wavy boundary.

B_{21} 19 to 27 inches, dark-brown (10YR 4/3, moist) silty clay loam; strong, medium, subangular blocky structure; firm; slightly vesicular; has light silica coatings on peds; many roots; strongly acid; clear, wavy boundary.

B_{22} 27 to 34 inches, dark-brown (10YR 4/3) silty clay loam; common, medium, prominent mottles of light olive brown (2.5Y 5/4) and yellowish red (5YR 4/6); moderate, medium to coarse, subangular blocky structure; firm; slightly vesicular; has light silica coatings on peds; many roots; strongly acid; clear, smooth boundary.

B_3 34 to 45 inches, dark grayish-brown (10YR 4/2) silty clay loam; common, medium, prominent mottles of grayish brown (2.5Y 5/2), dark reddish brown (5YR 3/4), and strong brown (7.5YR 5/6); strong, coarse, subangular blocky structure; firm; slightly vesicular; a few roots; strongly acid; clear, smooth boundary.

C 45 to 96 inches, yellowish-brown (10YR 5/4) silt loam; many, medium, distinct mottles of light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8); massive; slightly vesicular; has light silica coatings along cleavage planes; a few roots; strongly acid to a depth of 96 inches.

Judson series

The Judson soils are deep and well drained. They are Alluvial soils but are intergrading to the Brunizem great soil group. The soils are young. They are developing in silty materials that were washed or sloughed from upland soils that formed under prairie. The silty materials were then carried by water or gravity and were deposited on lower lying areas. Some areas of these soils occur in upland draws and drainageways. Others are on fans on the lower valley slopes or on bottoms where water flows out of drainageways. Most of the areas are small, but they occur throughout the county. The soils have varying amounts of chert, gravel, and cobblestones on the surface and throughout the profile. They are susceptible to slight to severe flooding.

The following describes à profile of a Judson silt loam:

A_{11} 0 to 9 inches, very dark gray (10YR 3/1, dry) to black (10YR 2/1, moist) silt loam; moderate, fine, granular structure; very friable; many roots; neutral; gradual, wavy boundary.

A_{12} 9 to 25 inches, very dark gray (10YR 3/1, dry) and black to very dark gray (10YR 2/1 to 3/1, moist) silt loam; moderate, medium, granular structure; very friable; slightly vesicular; has slight silica coatings on aggregates; many roots; neutral; gradual, wavy boundary.

A_{13} 25 to 35 inches, very dark gray to very dark grayish-brown (10YR 3/1 to 3/2, dry) and very dark gray to very dark brown (10YR 3/1 to 2/2, moist) silt loam; weak to moderate, medium, granular structure; very friable; slightly vesicular; has slight silica coatings on aggregates; many roots; medium acid; gradual, wavy boundary.

A_{14} 35 to 48 inches, very dark grayish-brown (10YR 3/2, dry) and very dark grayish-brown to very dark brown (10YR 3/2 to 2/2, moist), heavy silt loam; weak to moderate, medium to coarse, granular structure; very friable; slightly vesicular; has slight silica coatings on aggregates; medium acid.

Lindstrom series

The Lindstrom soils are deep and well drained. They belong to the Brunizem great soil group. The soils developed on concave valley slopes from loess of Peorian age. They are associated with the valley soils of the Fayette series, but they have a darker colored A horizon and a browner B horizon than the associated soils. In some places occasional pieces of grit and stone occur throughout the profile.

The following describes a profile of a Lindstrom silt loam:

A_p 0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; very friable; many roots; neutral.

A_1 8 to 12 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; very friable; many roots; slightly acid.

B_1 12 to 17 inches, dark-brown (10YR 3/3) silt loam; moderate, fine to medium, subangular blocky structure; friable; many roots; vesicular; earthworm activity; light-gray silica coatings on aggregates; medium acid.

B_{21} 17 to 25 inches, dark-brown to dark yellowish-brown (10YR 3/3 to 3/4), light silty clay loam; moderate, medium, subangular blocky structure; friable; many roots; vesicular; medium acid.

B_{22} 25 to 35 inches, dark yellowish-brown (10YR 3/4) silty clay loam; moderate, fine to medium, subangular blocky structure; firm; many roots; slightly acid.

B_3 35 to 42 inches, brown to dark yellowish-brown (10YR 4/3 to 3/4) silty clay loam; weak, medium, subangular blocky structure; firm; many roots; few, medium, distinct mottles of yellowish brown and grayish brown; slightly acid.

C 42 inches +, dark yellowish-brown (10YR 4/4) silt loam; massive; friable; few, medium, distinct mottles of yellowish brown and grayish brown; slightly acid.

Medary series

The Medary soils are deep and are moderately well drained. They are members of the Gray-Brown Podzolic great soil group. The soils are on high stream terraces along tributaries of the Wisconsin and Mississippi Rivers. They have developed in a thin covering of silty material

that overlies lacustrine clay. The clay was laid down in glacial times by slack waters of the major rivers.

The following describes a profile of a Medary silt loam:

A_p 0 to 7 inches, dark grayish-brown to very dark grayish-brown (10YR 4/2 to 3/2) silt loam; weak, very thick, platy structure, but plates break easily to weak, fine, subangular blocks; very friable; slightly vesicular; many roots; slightly acid; abrupt, smooth boundary.

B_1 7 to 14 inches, reddish-brown (5YR 4/3) silty clay loam; moderate, fine, subangular blocky structure; friable; vesicular; many roots; medium acid; clear, smooth boundary.

B_2 14 to 24 inches, reddish-brown (2.5YR 4/4) silty clay; moderate, fine to medium, subangular blocky structure; slightly sticky; slightly vesicular; a few roots; strongly acid; clear, smooth boundary.

B_3 24 to 30 inches, reddish-brown (5YR 4/3) silty clay; a few, medium, distinct mottles of yellowish red (5YR 5/6); weak to moderate, fine to medium, subangular blocky structure; plastic; slightly vesicular; a few roots; strongly acid; clear, wavy boundary.

C 30 to 40 inches, reddish-brown (5YR 5/3 to 4/3) silty clay; common, coarse, prominent mottles of yellowish red (5YR 4/8) and strong brown (7.5YR 5/6); massive; silica coatings on aggregates; strongly acid.

Meridian series

The Meridian series is made up of well-drained soils of the Gray-Brown Podzolic great soil group. The soils occur on stream terraces. They have developed in sandy outwash that in some places contains a small amount of silt. Stratified sand occurs in these soils at a depth between 24 and 36 inches. The sand generally contains thin lenses of sandy loam or of sandy clay loam.

These soils are associated with the Dakota, Gotham, Bertrand, and Tell soils. They have a lighter colored surface layer than the Dakota soils, and, unlike the Dakota soils, they developed under forest. Their B horizon is better developed than that of the Gotham soils, and their solum contains more fine material. They are less silty than the Bertrand and Tell soils.

The Meridian soils are fairly uniform. They vary mainly in the color of the surface layer and in the texture and development of the B horizon. They also vary in the characteristics of the underlying substratum and in depth over the substratum. In some places the A_3 or B_1 horizon is lacking.

The following describes a profile of a Meridian sandy loam:

A_p 0 to 8 inches, very dark grayish-brown to dark-brown (10YR 3/2 to 3/3) sandy loam; weak, fine, subangular blocky structure that breaks readily to moderate, fine granules; very friable; many roots and wormcasts; slightly acid; abrupt, smooth boundary.

A_2 8 to 11 inches, dark-brown (10YR 3/3 to 4/3) sandy loam; weak, medium, platy structure; slightly firm in place, but very friable when disturbed; vesicular; many wormcasts in the upper part of this horizon; many roots; slightly acid; clear, smooth boundary.

B_2 11 to 19 inches, dark-brown (7.5YR 3/4 to 4/4), heavy loam; moderate, medium, subangular blocky structure; firm in place, but friable when disturbed; many roots; medium acid; clear, wavy boundary.

B_3 19 to 28 inches, dark-brown (7.5YR 4/4) fine sandy loam; weak, medium, subangular blocky structure; friable; many roots; strongly acid; clear, smooth boundary.

C_1 28 to 34 inches, strong-brown (7.5YR 5/6) fine sand; loose; single grain; a few dark-brown (7.5YR 4/4) spots and streaks of finer textured materials; strongly acid, clear, wavy boundary.

C_2 34 inches +, brownish-yellow (10YR 6/6) fine sand; many spots and streaks of dark-brown (7.5YR 4/4) sandy clay loam; the finer textured spots and streaks are not continuous; single grain; loose; strongly acid.

Norden series

The Norden series consists of well-drained soils developed under forest. The soils are members of the Gray-Brown Podzolic great soil group. They developed partly in loess and partly in the underlying materials weathered from sandstone, siltstone, and shale of the Franconia formation.

The Norden soils are associated with Gale and Hixton soils. They have a finer textured substratum than the Gale and Hixton soils, and, consequently, their water-holding capacity is higher.

The surface layer of the Norden soils ranges in texture from fine sandy loam to silt loam, but the texture depends somewhat on the influence of the loess. The amount of glauconitic material in the B horizons varies, as does the proportion of sand, silt, and shale in the substratum.

The following describes a profile of a Norden fine sandy loam:

A_p 0 to 6 inches, very dark gray (10YR 3/1) fine sandy loam; weak, fine, granular structure; friable; roots abundant; neutral.

B_{11} 6 to 16 inches, dark-brown (10YR 4/3) fine sandy loam; weak, medium, subangular blocky structure; friable; many roots; neutral.

B_{12} 16 to 27 inches, dark-brown (10YR 4/3) light loam; weak, medium, subangular blocky structure; friable; many roots; neutral.

B_2 27 to 36 inches, dark yellowish-brown (10YR 4/4) sandy clay loam; moderate, medium, subangular blocky structure; firm; thin, patchy clay films on surfaces of the peds; wormholes; many roots; neutral.

B_3 36 to 40 inches, olive-brown (2.5Y 4/4) sandy clay loam; moderate, medium, subangular blocky structure; firm; continuous, high-contrast, dark-brown (10YR 4/3) clay films on surfaces of the peds; many roots; neutral.

C 40 inches +, olive-brown (2.5Y 4/4), fine glauconitic sandstone and siltstone residuum; olive (5Y 4/3), dark olive-gray (5Y 3/2), and grayish-green (5G 4/1) lenses of glauconitic materials; massive to very weak, thick, platy structure; neutral.

Orion series

The Orion soils are nearly level and are somewhat poorly drained. They belong to the Alluvial great soil group. The soils developed on bottom lands in silty sediments deposited by streams. The soils are closely associated with the Arenzville soils, which are well drained to moderately well drained.

The frequency of flooding varies in the Orion soils. There is an intermittent high water table. Because of stratification, the horizons vary widely in thickness and arrangement, and also in the number of mottles. In many places there is an old, dark, buried soil at a depth of more than 18 inches. In this county the Orion soils in some areas are poorly drained. In these areas the soil is mapped as a poorly drained variant.

The following describes a profile of an Orion silt loam:

A_{11} 0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, platy structure; friable; many plant roots; neutral; clear, smooth boundary.

A_{12} 2 to 18 inches, dark-gray (10YR 4/1) silt loam; many, distinct mottles of yellowish brown (10YR 5/8);

moderate, fine to medium, subangular blocky structure; friable; many plant roots in the uppermost 10 inches; neutral; abrupt, smooth boundary.

A_{11b} 18 to 31 inches, black (10YR 2/1) silt loam; a few, distinct dark-brown (10YR 4/3) mottles; weak, fine, subangular blocky structure; friable; a few sedge roots; neutral; gradual, wavy boundary.

A_{12b} 31 to 42 inches, very dark grayish-brown (2.5Y 3/2) silty clay loam; massive; firm; many, fine, prominent mottles of yellowish brown (10YR 5/6); neutral.

Richwood series

The Richwood series is made up of well-drained soils that belong to the Brunizem great soil group. The soils developed in deep, silty materials on the nearly level terraces of streams. They are underlain by weakly stratified sandy outwash that contains fine gravel. Depth to the sandy outwash and gravel is more than 42 inches.

These soils are closely associated with somewhat poorly drained Rowley soils and with moderately well drained Toddville soils. They are similar to the Bertrand soils, but they have a darker, thicker surface layer than the Bertrand soils and lack the A_2 horizon that is typical of those soils. The Richwood soils are also similar to the Waukegan soils, but they developed in materials that are deeper than those in which the Waukegan soils developed. The Richwood soils have a more silty surface layer than the Dakota soils and a thicker, finer textured solum.

The solum of the Richwood soils is slightly acid, but the lower part of the substratum is neutral. The A horizon ranges from black to very dark gray or very dark brown and is 9 to 24 inches thick. Depth to outwash sand and gravel ranges from 42 to more than 60 inches.

The following describes a profile of a Richwood silt loam:

A_p 0 to 8 inches, black (10YR 2/1) silt loam; moderate, medium, granular structure; friable; many plant roots; neutral; abrupt boundary.

A_1 8 to 13 inches, black to very dark brown (10YR 2/1 to 2/2) silt loam; weak, very thick plates that break to moderate, medium granules; friable; moderately vesicular and contains many earthworm casts; many plant roots; medium acid.

A_3 13 to 19 inches, dark-brown (10YR 3/3) silt loam; very dark grayish-brown (10YR 3/2) coatings on peds; weak, medium, subangular blocks that break to weak, medium to thin plates; friable; moderately vesicular; contains many earthworm casts and holes; many plant roots; medium acid.

B_1 19 to 26 inches, dark-brown (10YR 4/3), light silty clay loam; moderate, fine to medium, subangular blocky structure; firm; slightly vesicular; silica coatings on the surfaces of the aggregates; many plant roots; medium acid.

B_2 26 to 34 inches, dark yellowish-brown (10YR 3/4) silty clay loam; moderate, medium, subangular blocky structure; firm; slightly vesicular; silica coatings on the surfaces of peds; many plant roots; medium acid.

B_3 34 to 42 inches, dark yellowish-brown to yellowish-brown (10YR 4/4 to 5/4), light silty clay loam; weak, fine, subangular blocky structure; firm; a few plant roots; medium acid.

C_1 42 to 48 inches, dark yellowish-brown to yellowish-brown (10YR 4/4 to 5/4) silt loam; massive; friable; medium acid.

C_2 48 to 60 inches, brown (10YR 5/3) silt loam; massive; friable; many, medium, distinct mottles of grayish brown and yellowish brown (10YR 5/2 and 5/4); medium acid; grades to medium sand at a depth below 5 feet.

Rowley series

The Rowley soils are deep, silty, somewhat poorly drained Brunizems that intergrade to the Humic Gley great soil group. They are on stream terraces. The soils are associated with well-drained Richwood soils and with moderately well drained Toddville soils.

The surface layer of the Rowley soils varies in thickness. These soils also vary in internal drainage and in the abundance and intensity of mottles. In addition, the texture of the B horizons ranges from light to heavy silty clay loam.

The following describes a profile of a Rowley silt loam:

A_p 0 to 8 inches, very dark gray (10YR 3/1) silt loam; weak to moderate, fine to medium, granular structure; friable; many roots; neutral; abrupt, wavy boundary.

A_1 8 to 12 inches, very dark gray (10YR 3/1) silt loam; weak, thick, platy structure, but plates break easily to weak, fine, subangular blocks; friable; slightly vesicular; many roots; slightly acid; clear, wavy boundary.

A_3 12 to 15 inches, dark gray to very dark gray (10YR 4/1 to 3/1) silt loam; common, medium, distinct mottles of dark yellowish brown; moderate, thick, platy structure, but plates break to moderate, fine, subangular blocks; friable; slightly vesicular; many roots; medium acid; clear, wavy boundary.

B_{21g} 15 to 21 inches, dark-gray (10YR 4/1) silty clay loam; many, common, distinct mottles of dark grayish brown and yellowish brown (10YR 4/2 and 5/6); weak to moderate, fine, subangular blocky structure; slightly sticky; slightly vesicular; many roots; medium acid; clear, wavy boundary.

B_{22g} 21 to 28 inches, dark grayish-brown (10YR 4/2) silty clay loam; many, common, distinct mottles of yellowish brown (10YR 5/6); weak to moderate, fine, subangular blocky structure; slightly sticky; vesicular; a few roots; medium acid; clear, wavy boundary.

B_{3g} 28 to 42 inches, gray (10YR 5/1) silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8); weak, fine, subangular blocky structure; slightly sticky; vesicular; slightly acid; clear, wavy boundary.

C 42 inches +, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/8), light silty clay loam; massive; plastic; many dark reddish-brown (5YR 2/2) manganese concretions; slightly acid.

Seaton series

The Seaton soils are deep and silty and are well drained. They belong to the Gray-Brown Podzolic great soil group. In this county these soils occur only on the terrace near Bridgeport. They developed in coarse-textured loess of Peorian age and are underlain by very fine sand at a depth of approximately 4 to 5 feet. Limestone bedrock of the Prairie du Chien formation, or in some places granitic gravel, occurs at a depth of 7 feet or more.

These soils are similar to the Fayette soils, but they are coarser textured throughout, have a less well-developed profile, and have coarser material in the substratum. Because of their billowy relief and the coarse texture of the underlying material, the Seaton soils are subject to severe erosion.

The following describes a profile of a Seaton silt loam:

A_p 0 to 5 inches, very dark grayish-brown (10YR 3/2), light silt loam; weak, medium, granular structure; very friable; many roots; neutral; clear, wavy boundary.

A_2 5 to 9 inches, brown (10YR 5/3), light silt loam; weak, thin, platy structure; very friable; slightly vesicular; many roots; neutral; gradual, wavy boundary.

B_1 9 to 18 inches, brown to dark-brown (7.5YR 5/4 to 4/4) silt loam; weak, fine, subangular blocky structure; very friable; slightly vesicular; many roots; neutral; gradual, wavy boundary.

B_{21} 18 to 36 inches, dark-brown (10YR 4/3), heavy silt loam; weak to moderate, subangular blocky structure; friable; slightly vesicular; many roots; medium acid; gradual, wavy boundary.

B_{22} 36 to 56 inches, dark-brown (10YR 4/3) silt loam; weak to moderate, coarse, subangular blocky structure; very friable; slightly vesicular; a few roots; medium acid; abrupt, wavy boundary.

C 56 to 80 inches, yellowish-brown (10YR 5/6) very fine sandy loam; massive; very friable; a few roots; medium acid; abrupt, smooth boundary.

D 80 inches +, pale-yellow (2.5Y 7/4) limestone bedrock; slight effervescence.

Sparta series

The Sparta soils are somewhat excessively drained Regosols that are intergrading to the Brunizem great soil group. In Crawford County they occur mainly on the terrace near Prairie du Chien. These soils developed in noncalcareous sandy outwash. They are associated with the Dakota soils and are somewhat similar to those soils. They have no B horizon, however, or only a weakly developed B horizon and have developed in coarser textured materials.

The Sparta soils vary mainly in the color and thickness of the A_{11} and the A_{12} horizons. In some places, at a depth of more than 40 inches, there are thin layers of material that is finer textured than the typical soil material.

The following describes a profile of a Sparta loamy fine sand:

A_{11} 0 to 9 inches, black (10YR 2/1) to very dark brown (10YR 2/2) loamy fine sand; weak, medium, granular structure; very friable; many roots and pores; medium acid; gradual, wavy boundary.

A_{12} 9 to 17 inches, very dark brown (10YR 2/2) loamy fine sand; weak, medium, subangular blocky structure; very friable; many roots and pores; slightly acid; gradual, smooth boundary.

A_3 17 to 23 inches, dark-brown (10YR 3/3) to dark yellowish-brown (10YR 3/4) loamy sand; very weak, coarse, subangular blocky structure; very friable; many roots and pores; medium acid; clear, wavy boundary.

C_1 23 to 30 inches, dark yellowish-brown (10YR 4/4) sand; single grain; loose; a few roots; medium acid; clear, wavy boundary.

C_2 30 to 68 inches, yellowish-brown (10YR 5/6) to brownish-yellow (10YR 6/6), loose sand; medium acid.

Tell series

The Tell series is made up of moderately deep, silty soils that are well drained. The soils belong to the Gray-Brown Podzolic great soil group. They are on high to medium stream terraces and have developed in silty materials, 24 to 40 inches thick, that are underlain by sandy outwash. The soils are similar to the Bertrand soils, but they are underlain by sand at a shallower depth.

In some areas of these soils, depth to the underlying sand is between 10 and 20 inches. In the areas on the Bridgeport terrace, the soils have granitic gravelly outwash mixed in the substratum. Because of their billowy topography and the coarse texture of the underlying material, the Tell soils are susceptible to severe erosion.

The following describes a profile of a Tell silt loam:

A_p 0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; weak to moderate, medium, granular structure; very friable; many roots; slightly acid; abrupt, smooth boundary.

A_2 8 to 11 inches, dark grayish-brown (10YR 4/2) silt loam; weak to moderate, thin, platy structure; very friable; slightly vesicular; has silica coatings on plates; many roots; slightly acid; clear, smooth boundary.

B_1 11 to 16 inches, dark-brown (10YR 4/3) loam; moderate, fine to medium, subangular blocky structure; friable; slightly vesicular; has silica coatings on the aggregates; many roots; slightly acid; clear, wavy boundary.

B_2 16 to 22 inches, dark-brown to dark yellowish-brown (10YR 4/3 to 4/4), heavy loam; moderate, medium to coarse, subangular blocky structure; friable; slightly vesicular; has silica coatings on aggregates; many roots; slightly acid; clear, wavy boundary.

B_3 22 to 26 inches, dark-brown to dark yellowish-brown (10YR 4/3 to 4/4) sandy clay loam; moderate, coarse, subangular blocky structure; friable; slightly vesicular; has silica coatings on the aggregates; slightly acid; abrupt, smooth boundary.

D 26 to 35 inches, yellowish-brown (10YR 5/6) sand; single grain; loose; interspersed bands of dark reddish-brown (5YR 3/4) loam that are 2 to 3 inches wide; massive; friable; strongly acid.

Toddville series

The Toddville soils are deep and silty and are moderately well drained. They are members of the Brunizem great soil group. These soils developed in silt. They occur on high stream terraces, mainly in the Citron and Haney Valleys. The soils are generally in slight depressions on the terraces or in areas where runoff water from the uplands accumulates on the terraces. They generally have somewhat restricted surface and internal drainage. The soils are highly productive if they are well managed. Most of the areas are used for crops.

These soils are associated with well-drained Richwood soils and somewhat poorly drained Rowley soils. In drainage they are similar to the Jackson soils, but their A horizon is darker and thicker than that of the Jackson soils. Depth of the silty materials in the Toddville soils ranges from 42 inches to 5 or more feet, and the thickness of the solum, from 40 to 48 inches. The mottles in the B horizon range in abundance from few to common and, in size, from fine to medium.

The following describes a profile of a Toddville silt loam:

A_1 0 to 12 inches, black (10YR 2/1) to very dark brown (10YR 2/2) silt loam; moderate, coarse to medium, granular structure; soft when dry, but friable when moist; many roots; very porous; neutral; clear, smooth boundary.

A_3 12 to 16 inches, very dark brown (10YR 2/2) to very dark grayish-brown (10YR 3/2) silt loam; weak to moderate, coarse, subangular blocky structure; slightly hard when dry, but friable when moist; many roots and pores; medium acid; clear, wavy boundary.

B_1 16 to 26 inches, dark-brown (10YR 4/3) silt loam; weak to moderate, subangular blocky structure; hard when dry, but friable when moist; many roots and fine pores; strongly acid; clear, wavy boundary.

B_2 26 to 36 inches, dark-brown (10YR 4/3), light silty clay loam; dark-brown (10YR 3/3) faces on peds; few, fine, faint mottles; moderate, medium, subangular blocky structure; hard when dry, but firm when moist; many fine roots and some root channels that are 5 millimeters in diameter; a few fine pores; strongly acid; gradual, wavy boundary.

B_3 36 to 44 inches, dark-brown (10YR 4/3), heavy silt loam; dark-brown (10YR 3/3) faces on peds; common, medium, prominent mottles of yellowish red (5YR 5/8); moderate, coarse, subangular blocky structure; hard when dry, but firm when moist; a few fine roots; the

larger pores have clay skins; strongly acid; gradual, wavy boundary.

C 44 to 60 inches, dark-brown (10YR 4/3) to dark grayish-brown (10YR 4/2) silt loam; massive; slightly hard when dry, but friable when moist; a few fine roots and a few old root channels that are 3 to 5 millimeters in diameter; very dark grayish-brown (10YR 3/2) stainings from organic matter; strongly acid.

Waukegan series

The Waukegan series consists of nearly level, well-drained Brunizems that occur on stream terraces. These soils developed under tall grasses in silty materials, 24 to 40 inches thick. The silty materials overlie stratified sand and fine gravel. The soils are medium acid to slightly acid.

These soils are closely associated with Dakota, Richwood, and Tell soils. They have developed in more silty material than the Dakota soils and have a better developed B horizon that contains more silt. Their solum is somewhat shallower over outwash sand and fine gravel than that of the Richwood soils, and they typically lack a C horizon. The Waukegan soils are similar to the Tell soils, developed under forest, but they have a darker colored A horizon and a browner B horizon.

The following describes a profile of a Waukegan silt loam in a cultivated area:

A_p 0 to 8 inches, black (10YR 2/1) silt loam; weak medium, subangular blocky structure that breaks to moderate, medium granules; friable; many plant roots; neutral; abrupt, smooth boundary.

A_1 8 to 12 inches, black (10YR 2/1) silt loam; moderate, fine, subangular blocky structure; friable; many plant roots; moderately vesicular; neutral; clear, wavy boundary.

A_3 12 to 16 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, thick, platy structure; very friable; slightly vesicular; many earthworm casts; many plant roots; medium acid; clear, wavy boundary.

B_1 16 to 24 inches, dark grayish-brown (10YR 4/2), light silty clay loam; moderate, fine to medium, subangular blocky structure; firm; slightly vesicular; many earthworm casts; many plant roots; medium acid; clear, wavy boundary.

B_2 24 to 30 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm; slightly vesicular; many plant roots; medium acid; clear, wavy boundary.

B_3 30 to 36 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; a few plant roots; medium acid; abrupt, smooth boundary.

D 36 inches +, light yellowish-brown to yellowish-brown (10YR 6/4 to 5/6) fine sand; single grain; loose; stratified; contains thin bands of fine sandy loam that are at a depth of 45 inches or more; medium acid.

Agriculture

Early settlers in the county followed an agricultural pattern similar to that of the Indians, who grew corn, squash, beans, and melons in small plots near their villages. In 1818, a gristmill, powered by water, was built in Prairie du Chien. Then, the farmers in the area began to grow more wheat to provide flour for the garrison at Fort Crawford and for use on their farms. From about 1860 to 1880, when Wisconsin was a leading producer of wheat, wheat was the main crop in this county. Then, the fertility of the soils decreased, insects and diseases affecting wheat increased, and prices of wheat became lower as the result of competition from States farther West. Consequently, the farmers of the county stopped growing wheat and turned to livestock farming, which is still predominant (*2*).

Crawford County has rolling, rough topography. The practices used by the early farmers caused erosion on most of the ridges used for cultivated crops. As a result of gully and sheet erosion caused by runoff, much of the fertile uppermost part of the soils on ridges was washed down onto the bottoms. The farmers realized that a change in farming practices was needed to keep the soils productive and to prevent further erosion. In 1940, they organized the Crawford County Soil Conservation District. Conservation practices have now been applied on about 55 percent of the cropland. Stripcropping is the practice used the most widely to conserve the soils, but many other practices are being applied effectively to make sure that all the soils are used in the best way possible.

In the following pages the more outstanding features of the agriculture of the county are discussed. Statistics used are from reports published by the U.S. Bureau of the Census.

Land Use

In 1954, 332,470 acres, or 88.6 percent of the total acreage in Crawford County, was in farms. The farmland, by use, and the acreage used for each purpose in 1954 are as follows:

	Acres
Cropland, total	138,345
Harvested	110,930
Used only for pasture	23,518
Not harvested or pastured	3,897
Woodland, total	156,354
Pastured	130,539
Not pastured	25,815
Other land pastured (not cropland and not woodland)	21,334
Land pastured, total	175,391
Other land (house lots, roads, wasteland, and so on)	16,437

The acreage in farms has been fairly stable for about 50 years. More than one-third of the total acreage in the county is covered by trees, and few of the wooded areas would be suitable for crops if they were cleared. Most of the permanent pastures are wooded, but the areas would be better used either for trees or pasture, rather than for both.

Types and Sizes of Farms

In 1954, 1,674 farms were in Crawford County. Of these, 206 were miscellaneous and unclassified. The rest, according to the major source of income, are classified as follows:

	Number
Dairy farms	1,006
Livestock farms other than dairy or poultry	247
General farms	125
Field crops	70
Vegetable farms	15
Poultry	5

Livestock is the major source of income for about 75 percent of the farmers in the county. A large part of the income from the sale of livestock and livestock

products is derived from the sale of dairy products. Most of the crops are fed to dairy cattle or other livestock. On the general farms, about half of the income from the sale of farm products is derived from the sale of crops, and about half from livestock and livestock products.

In 1954, the average size of the farms in the county was about 199 acres. The farms are larger than the average for the State because they contain many large areas of Steep stony and rocky land, which are not suitable for agriculture.

Crops

Forage crops are grown extensively in the county to provide feed for livestock. Cash crops are grown on a few farms. Tobacco and apples are the most important cash crops.

Hay was grown on more than 37 percent of the total cropland in 1954. The acreage in hay has been about the same for many years, but the kind of hay grown has changed greatly. Between 1944 and 1954, the acreage used to grow clover and timothy together for hay decreased from 36,436 acres to 23,231 acres. The acreage used to grow alfalfa and alfalfa mixtures increased during the same period from 9,810 acres to 38,899 acres. Except in very dry years, little wild hay is harvested.

Alfalfa generally gives higher yields of good-quality forage than clover and timothy. It needs a fertile, well-drained soil, and to yield well, it requires lime, potash, and phosphate. Alfalfa is generally seeded in April, with oats or some other nurse crop, in a mixture consisting of alfalfa and bromegrass or of alfalfa, clover, and timothy. As a rule, two cuttings are made each year, but in some years three cuttings are made. The alfalfa can generally be pastured lightly after the first killing frost in fall.

Second to alfalfa, the crops most widely used for hay are clover and timothy grown together. The mixture commonly used for seeding is 5 pounds per acre of red clover, 3 pounds of alsike clover, and 2 pounds of timothy. This mixture is generally planted in April with oats or with some other small grain used as a nurse crop. It is drilled in with the small grain, or it is broadcast after the small grain has been seeded.

The acreage used for corn is next largest to that used for hay crops. In 1954, corn was grown on 32,643 acres, or on about 24 percent of the cropland. Practically all of the corn is used on the farm to provide feed for livestock. The average yield per acre varies, but in recent years it has ranged from 56 to 59 bushels per acre. Before 1940, much of the corn was used for silage. Now, because of the widespread growing of hybrid varieties of corn, which require less time to mature, about 77 percent of the acreage used for this crop is in corn grown for grain.

When corn is to be grown, the soil is generally plowed in spring and prepared for seeding in May. Some lime and fertilizer are applied. The corn is cultivated two or three times during the season to control weeds. It is harvested for grain in October or November, depending upon the weather. Usually, corn cut for silage is harvested when the grain begins to dent. If there has been an early frost, however, the crop is harvested as soon after the frost as possible.

Oats have always been an important crop in Crawford County. In 1954, they were grown on 21,926 acres, or on about 16 percent of the cropland. The average yield is about 41 bushels per acre, but it ranges from 37 to 45 bushels.

Oats are grown mainly as a nurse crop for hay. The fields used for oats are often plowed in fall and are left rough during the winter. In spring the soil is disked and smoothed, and the oats are seeded in April or before the 15th of May. A grain drill is generally used for seeding, but the oats can be broadcast and covered by harrowing. Fertilizer is sometimes used to assure a better stand of the accompanying hay crop. If the oats are planted for grain, little or no nitrogen fertilizer is applied. Nitrogen is likely to cause the oats to grow too tall. This makes them susceptible to lodging and makes harvesting difficult.

After the oats mature, they are harvested by using a binder or combine. Most of them are ground, mixed with protein concentrates, and fed on the farm. The straw is baled and used as bedding. In some places oats are used as a supplementary hay crop and are cut green.

Wheat, rye, and barley were once important in this county as feed and cash crops, but they are less important each year.

Tobacco is an important source of income on some farms. Crawford County ranks third in the State in acreage used for tobacco. In 1954, tobacco was grown on 1,372 acres and yielded about 1,276 pounds per acre. Much of the crop is used for cigar binders. About half of the tobacco grown for cigar binders in the United States comes from Wisconsin.

Because of concern about a possible decline in the quality of tobacco, studies were made in southern Wisconsin to determine if there is a relationship between characteristics of the soils and the quality of tobacco grown.[4] The result of these studies indicates that soils should have certain characteristics if tobacco of good quality is to be grown. If the soils lack those characteristics, tobacco may still be grown, but it may not be of so good a quality. The characteristics of soils that influence the quality of tobacco are listed in the paragraphs that follow. By referring to the section "Descriptions of Soils," this general information can be applied to the soils on an individual farm.

Tobacco of good quality is grown in valleys on nearly level soils formed under prairie grasses. The surface layer of the soils needs to be 9 inches or more deep and should have two-thirds or more of the original surface layer remaining. The soils ought to be 30 inches or more deep over sand or rock and have a texture of loam or clay loam. They need to be well drained to moderately well drained and have a pH of 5.5 to 6.7. The soils ought to contain 350 or more pounds per acre of available potassium, less than 35 pounds of available chlorine, 650 to 1,000 pounds of available magnesium, 2,600 to

[4] LINK, ERNEST G. THE RELATIONSHIP OF SOME SOIL FACTORS TO TOBACCO QUALITY IN SOUTHERN WISCONSIN. Thesis. 1954. Univ. of Wis.

4,400 pounds of available calcium, and less than 45 pounds of available sodium.

Tobacco of poorer quality can be grown on ridge soils formed under timber. These soils have slopes of 2 or more percent and a surface layer that is less than 9 inches thick. They may have less than two-thirds of the original surface layer remaining. The soils are less than 30 inches deep over sand or rock, are somewhat poorly drained to poorly drained, and have a pH of less than 5.5 or more than 6.7. As a rule, they contain, per acre, less than 350 pounds of available potassium, more than 35 pounds of available chlorine, less than 650 or more than 1,000 pounds of available magnesium, less than 2,600 or more than 4,400 pounds of available calcium, and more than 45 pounds of available sodium.

Generally, soils on which the highest yields of tobacco per hour of labor were produced were those that had been used for tobacco the longest. On these soils commercial fertilizer and manure had been added and cover crops had been grown. In growing tobacco, good management consists of: (1) Growing tobacco for 6 or more years; (2) applying 440 pounds per acre of commercial fertilizer each year; (3) applying 15 or more loads of barnyard manure per acre each year; and (4) plowing under a green-manure crop every 1 or 2 years.

Apples are a minor cash crop in the county, but they are increasing in importance. In 1954, there were 42,804 bearing trees in the county and 132,974 bushels of apples were produced.

The apple orchards are generally on the rounded tops of fairly narrow ridges, mainly near Gays Mills. The Dubuque silt loams, the Dubuque silt loams, deep, and the Fayette silt loams are the main soils used for orchards. These soils are underlain by limestone. In most places near the tops of the ridges, slopes are about 5 percent. Near the edges of the ridges, however, slopes are as much as 20 to 25 percent. A steep limestone escarpment at the edge of the ridges marks the lower limit of orchards in the county.

In other areas in the coulee region, apple orchards are generally on the upper side slopes in the valleys. The valleys in Crawford County are much deeper, however, and have steep sides. The slopes that could be planted to orchards are in a fairly low position, compared to those used for orchards in the other areas. On the valley slopes in Crawford County, air drainage—needed to move cold air away from the orchards to a lower elevation—would not be so effective as on the ridges.

The young trees are generally started in the shallow soils. They are then moved to the tops of the ridges and are planted in the deeper soils where slopes are generally not so strong as they are toward the edge of the ridges. Here, in the deep soils, more moisture is available for the trees; furthermore, because the slopes are milder, farm equipment is easier to operate.

The first orchards in the county were planted about 24 feet apart in straight rows that were cultivated up and down the slope. As a result, many old trees now stand on mounds, which marked the level of the original surface layer of a former deep soil. Between the mounds, erosion has cut deep into the soils. Now, in many places, the young trees are planted on the contour and are spaced about 34 feet apart. The spacing allows light to penetrate, so that a dense cover of sod can become established. The cover helps to provide moisture for the trees and reduces runoff and erosion. Planting the trees on the contour reduces the loss of soil through erosion and cuts the cost of maintaining the orchard. Access roads should also be built on the contour. Then, spraying equipment and other power machinery can be moved through the orchards at less cost, and the machines can be operated more effectively.

Permanent Pastures

About 53 percent of the land in farms, or 175,391 acres, was used for pasture in 1954. About 75 percent of the acreage in pasture was pastured woodland, and about 13 percent was used only for pasture. The rest consisted of narrow and stony areas or of wet bottom lands. The most common plants in the permanent pastures are Kentucky bluegrass, whiteclover, redtop, and timothy.

Pastured woodland is not productive of trees, nor does it give good yields of forage. Many of the areas are so steep and stony that they cannot be renovated. These rough areas can be fenced to keep cattle out and can then be used to grow trees and to provide habitats for wildlife. If the wooded areas are needed for pasture, they should be cleared.

Many of the permanent pastures can be improved by renovating them. Experiments show that 1 acre of renovated pasture is equal to between 2 and 5½ acres of untreated pasture, or to 11.3 acres of wooded pasture (*1*). Begin renovating pastures in fall by broadcasting lime and a complete fertilizer. The amounts used are determined by the needs indicated by soil tests. After the lime and fertilizer have been added, tear the sod with a disk, harrow, or field cultivator. Fields prepared in this way are left rough. They are, therefore, not so subject to erosion as plowed fields. The pastures are seeded around the first of May. The seeding mixture consists of inoculated legumes, such as 6 to 8 pounds of alfalfa and 5 pounds of medium red clover. It should also include 6 to 8 pounds of bromegrass.

The first year, renovated pastures are grazed lightly late in summer. In the following year, grazing is withheld in September and October, or until growth has been retarded by cold weather. This prevents the legumes from being damaged by overgrazing. Best results are obtained if grazing is rotated between renovated pastures and other pastures.

Areas that are in grass but that are not feasible to renovate can be improved by applying enough lime to raise the pH of the soils to 6.5 or 7.0. Phosphate and potash can be added according to the needs indicated by soil tests, and nitrogen can be applied early in spring.

Livestock and Livestock Products

In 1954, livestock and livestock products in this county accounted for about 86 percent of the income from the sale of farm products. Dairy cattle and hogs are the most important of the animals raised, but chickens are also important. The number of livestock on farms in the county is shown in table 9.

TABLE 9.—*Number of livestock on farms*

Livestock	1940	1950	1954
Cattle and calves	[1] 39, 588	45, 746	51, 227
Hogs and pigs	[2] 17, 041	36, 244	51, 905
Horses and mules	[1] 7, 105	3, 643	1, 641
Sheep and lambs	[3] 6, 499	4, 391	4, 789
Chickens	[2] 112, 601	[2] 111, 537	[2] 146, 061

[1] More than 3 months old.
[2] More than 4 months old.
[3] More than 6 months old.

The number of dairy cattle has increased steadily during the past few years. There were about 21,000 dairy cattle in the county in 1929 as compared to 25,000 in 1954. In 1954, dairy products accounted for nearly half of the income derived from the sale of livestock and livestock products. More than 110 million pounds of whole milk and nearly 196,000 pounds of butterfat were sold in 1954. In addition, some income was derived from cattle and calves sold alive. The amount of butterfat sold has decreased, but the production of cheese has increased.

In 1954, hogs and pigs were reported sold from about 73 percent of the farms. They accounted for about 27 percent of the income derived from the sale of farm products.

The number of horses and mules in the county has decreased in the past few years because of the increasing use of tractors. Sheep are raised on some of the farms. Their number is declining, however, because raising dairy cattle has proved to be more profitable.

A total of 719,423 dozen chicken eggs was sold from 946 farms in 1954. On 71 farms, some income was derived from the sale of turkeys, ducks, and geese, and from their eggs.

Farm Income and Expenditures

Although livestock and livestock products accounted for a large part of the farm income in the county in 1954, about 13 percent of the income was derived from the sale of crops. Tobacco and apples were the principal crops sold.

The largest item of expense for most farmers in the county in 1954 was feed for livestock. About 87 percent of the farmers reported purchases of feed. Other large items of expense were expenditures for machine hire and for hired labor. Commercial fertilizer was reported purchased by 1,237 farmers, and lime and liming materials, by 202 farmers.

Farm Tenure

About 60 percent of the farms in the county were operated by owners in 1954. In that year tenants operated about 27 percent of the farms, and part owners operated about 13 percent. Only four farms were operated by managers.

The number of farms operated by tenants was at its highest—39 percent in 1940—but has since declined. The most common system of tenancy is livestock-share farming. With this type of tenancy, investments and profits are shared equally.

Marketing

In Crawford County most of the milk that is marketed is picked up daily. It is delivered to dairy plants by truckers who are under contract to dairies or to groups of farmers. Only a few farmers make their own deliveries to the plants.

The number of hogs marketed varies widely from year to year, depending upon marketing conditions in other parts of the country. Most of the hogs and pigs are sold to dealers or to wholesale buyers.

Cattle and calves are sold alive from many of the farms in the county. Most of the calves are sold for veal. They are consigned mainly to stockyards or are sold directly to packers.

Chickens and eggs are generally sold locally to stores or to poultry dealers. The chickens are generally sold alive because of the lack of dressing facilities.

Most of the crops are fed to livestock on the farm, but some specialized crops are marketed. Tobacco is marketed through warehouses at Soldiers Grove and Gays Mills. Most of the apples are sold to wholesale buyers, although some are sold locally from the orchards and from roadside stands.

Literature Cited

(1) AHLGREN, H. L., WALL, M. L., MUCKENHIRN, R. J., AND BURCALOW, F. V.
1944. EFFECTIVENESS OF RENOVATION IN INCREASING YIELDS OF PERMANENT PASTURE IN SOUTHERN WISCONSIN. Jour. Amer. Soc. Agron. 36: 121–131.

(2) EBLING, WALTER H.
1956. WISCONSIN RURAL RESOURCES, CRAWFORD COUNTY. Wis. State Dept. of Agr. Crop and Livestock Reporting Serv. 54 pp., illus. Madison.

(3) GEVORKIANTZ, S. R., AND SCHOLZ, H. F.
1948. TIMBER YIELDS AND POSSIBLE RETURNS FROM THE MIXED-OAK FARMWOODS OF SOUTHWESTERN WISCONSIN. Pub. 521, U.S. Dept. Agr., Forest Serv. in cooperation with Wis. Dept. of Conserv. and Univ. of Wis., 72 pp., illus.

(4) HAYS, O. E., MCCALL, A. G., AND BELL, F. G.
1949. INVESTIGATIONS IN EROSION CONTROL AND THE RECLAMATION OF ERODED LAND AT THE UPPER MISSISSIPPI VALLEY CONSERVATION EXPERIMENT STATION NEAR LA CROSSE, WIS., 1933–43. U.S. Dept. Agr. Tech. Bul. 973, 87 pp., illus.

(5) LYON, T. L., AND BUCKMAN, H. O.
1943. THE NATURE AND PROPERTIES OF SOILS. Ed. 4. 499 pp., illus. New York.

(6) MARTIN, LAWRENCE.
1932. THE PHYSICAL GEOGRAPHY OF WISCONSIN. Wis. Geol. and Nat. Hist. Survey Bul. No. 36 [Ed. Ser. No. 4], 608 pp., illus.

(7) UNITED STATES DEPARTMENT OF AGRICULTURE.
1930. SOIL SURVEY OF CRAWFORD COUNTY, WISCONSIN. Ser. 1930, No. 34, 139 pp., illus.

(8) ———
1951. SOIL SURVEY MANUAL. U.S. Dept. Agr. Handb. No. 18, 503 pp., illus. [Replaces U.S. Dept. Agr. Misc. Pub. 274, the *Soil Survey Manual* published 1937.]

(9) WEIDMAN, SAMUEL, AND SCHULTZ, ALFRED R.
1915. THE UNDERGROUND AND SURFACE WATER SUPPLIES OF WISCONSIN. Wis. Geol. and Nat. Hist. Survey Bul. No. 35 [Econ. Ser. No. 17], 664 pp., illus.

(10) WISCONSIN GEOLOGICAL SURVEY.
1932. TOPOGRAPHIC MAP OF CRAWFORD COUNTY, WIS. [In cooperation with the U.S. Geological Survey], 1 p.

Meanings of Technical Terms

AC soil. A soil that has only A and C horizons in the profile and no clearly developed B horizon.

Aggregate, soil. A single mass or cluster consisting of many soil particles held together, such as a prism, crumb, or granule.

Alluvium. Soil or rock material, such as gravel, sand, silt, or clay, deposited by a stream of water.

Blowout. An area of soil from which most, or all, of the fine soil material has been removed by wind.

Bottom land. Nearly level land occupying the bottom of a valley that has a stream flowing through it. Subject to flooding and often referred to as a flood plain.

Boron. An element needed in small amounts for the growth of higher plants, particularly for the growth of alfalfa and similar legumes.

Chert. A structureless form of silica, closely related to flint; chert breaks into irregularly shaped, angular fragments that are as much as 3 inches in diameter.

Clay. (1) As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. (2) As a soil textural class, soil material that contains 40 percent or more clay, as defined under (1), less than 45 percent sand, and less than 40 percent silt.

Colluvium (colluvial deposits). Mixed deposits of rock fragments and coarse soil materials near the bases of steep slopes. The deposits have accumulated as the result of soil creep, slides, or local wash.

Concave slope. A slope that is shaped like a dish or bowl.

Consistence. The nature of soil material that is expressed by the resistance of the individual particles to separating from one another (cohesion) or by the ability of a soil mass to undergo a change in shape without breaking (plasticity). The consistence varies with the content of moisture. Thus, a soil aggregate or clod may be hard when dry and plastic when wet. Terms used to describe consistence are:

Friable. When moist, easily crushed by hand and coheres when pressed together. Friable soils are easily tilled.

Firm. When moist, crushes under moderate pressure, but resistance is distinctly noticeable. Firm soils are likely to be difficult to till.

Hard. When dry, is moderately resistant to pressure; can be broken in the hands without difficulty but is barely breakable between thumb and forefinger.

Loose. Noncoherent when moist or dry. Loose soils are generally coarse textured and are easily tilled.

Plastic. When wet, retains an impressed shape and resists being deformed; plastic soils are high in clay and are difficult to till.

Soft. Weakly coherent and fragile; when dry, breaks to powder or individual grains under slight pressure.

Convex slope. A slope that is bowed out.

Crop residue. The portion of a plant, or crop, left in the field after harvest.

Depressions. Low-lying areas that have no surface outlets for the water that accumulates in them or that have only poor outlets.

Diversion. A channel that has a supporting ridge on the lower side. It is constructed across the slope to intercept runoff and to minimize erosion or to prevent excess runoff from flowing onto lower lying areas. In some areas a series of diversions, similar to terraces, but with greater horizontal and vertical spacing, is constructed across the slope. Means the same as Diversion terrace.

Dolomite. A rock that contains a high proportion of calcium and magnesium carbonates. Ground dolomitic limestone that contains considerable magnesium carbonate as well as calcium carbonate is used widely as agricultural lime, especially on soils with a low content of magnesium.

Droughty soil. A soil that is low in water-storing capacity.

Dune. A mound or ridge of loose sand piled up by wind; common in areas where sand is abundant and the wind is usually strong, as along the shores of lakes or the sea and in some desert and semidesert areas.

Erosion. The detachment and movement of the soil material of the land surface by wind, moving water, or ice, and by such processes as landslides and creep.

Escarpment. A long, steep ridge of land or rock that resembles a cliff. It faces in one general direction and separates two areas of more nearly level land.

Genesis, soil. Mode or origin of the soil. Soil genesis refers particularly to the processes that cause the solum to develop from unconsolidated parent materials.

Horizon, soil. A layer of soil, approximately parallel to the soil surface, with characteristics produced by soil-forming processes. The relative positions of the several soil horizons in the soil profile and their nomenclature are given below:

Horizon A. The master horizon consisting of (1) one or more mineral horizons of maximum organic accumulation; or (2) surface or subsurface horizons that are lighter in color than the underlying horizon and that have lost clay minerals, iron, and aluminum with resultant concentration of the more resistant minerals; or (3) horizons belonging to both of these categories.

Horizon B. The master horizon of altered material characterized by (1) an accumulation of clay, iron, or aluminum, with accessory organic material; or (2) blocky or prismatic structure together with other characteristics, such as stronger colors, unlike those of the A horizons or the underlying horizons of nearly unchanged material; or (3) characteristics of both these categories. Commonly, the lower limit of the B horizon corresponds to the lower limit of the solum.

Horizon C. A layer of unconsolidated material, relatively little affected by the influence of organisms and presumed to be similar in chemical, physical, and mineralogical composition to the material from which at least a part of the overlying solum has developed.

Horizon D. Any stratum underlying the C, or the B if no C is present, which is unlike the C, or unlike the material from which the solum has formed.

Intrazonal soils. Any one of the great groups of soils having more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief or parent material over the normal influences of climate and vegetation.

Lacustrine deposits. Materials deposited in the waters of lakes and exposed by the lowering of the water level or by the elevation of the land.

Loess. Geological deposit of fairly uniform, fine material, mostly silt, presumably transported by the wind.

Mapping unit. Any soil, miscellaneous land type, soil complex, or undifferentiated soil group shown on the detailed soil map and identified by a letter symbol.

Massive. (See also Structure, Grade). Large uniform masses of cohesive soil, sometimes with ill-defined and irregular breakage, as in some of the fine-textured alluvial soils; structureless.

Mottled. Marked with spots of color; usually associated with poor drainage.

Nutrients, plant. Any element taken in by a plant, essential to its growth, and used by it in elaboration of its food and tissue.

Outwash. Crossbedded gravel, sand, and silt deposited by melt water as it flowed from the ice.

Parent material, soils. The horizon of weathered rock or partly weathered soil material from which the soil is formed. Horizon C of the soil profile.

Permeability, soil. The quality of the soil that enables it to transmit air and water. Moderately permeable soils transmit air and water readily, and, as a result, the soil is favorable for the growth of roots. Slowly permeable soils allow water and air to move so slowly that growth of roots may be restricted. Rapidly permeable soils transmit air and water rapidly; as a result, roots make good growth.

Phase, soil. A subdivision of the soil type covering variations that are chiefly in such external characteristics as relief, stoniness, and erosion.

Reaction. The degree of acidity or alkalinity of the soil expressed in pH values or in words as follows:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid.	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
		Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline.	9.1 and higher.
Slightly acid	6.1 to 6.5		

Relief. Elevations or inequalities of the land surface, considered collectively.

Renovation. Method of restoring soils used for pasture or hay to higher productivity by cultivating them carefully so that the tillage will not cause erosion. The soils are then limed, fertilized, and reseeded.

Sand. (1) Individual rock or mineral fragments having diameters ranging from 0.05 millimeter (0.002 inch) to 2.0 millimeters (0.079 inch). Sand grains consist chiefly of quartz, but they may be of any mineral composition. (2) The textural class

name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. Two or more soil types that are similar in kind, thickness, and arrangement of soil layers are normally designated as a soil series. In some places, however, a soil series may be represented by only one soil type. Soil series normally are named for a place near which they were first mapped.

Silt. (1) Individual mineral particles of soil that range in diameter between the upper size of clay, 0.002 millimeter, and the lower size of very fine sand, 0.05 millimeter. (2) Soil of the textural class called silt contains 80 percent or more of silt and less than 12 percent of clay. (3) Sediments deposited from water in which the individual grains are approximately of the size of silt, although the term is sometimes applied loosely to sediments containing considerable sand and clay.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soils includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying parent material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stratified. Composed of, or arranged in, strata, or layers, such as stratified alluvium. The term is confined to geological materials. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The aggregation of primary soil particles into compound particles, or clusters of primary particles, which are separated from adjoining aggregates by surfaces of weakness. Soil structure is classified according to grade, class, and type.

Grade. Distinctness of aggregation. It expresses the differential between cohesion within aggregates and adhesion between aggregates. Terms: Structureless (single grain or massive), weak, moderate, and strong.

Class. Size of soil aggregates. Terms: Very fine or very thin, fine or thin, medium, coarse or thick, and very coarse or very thick.

Type. Shape and arrangement of individual, natural soil aggregates. Terms: Platy, prismatic, columnar, blocky, subangular blocky, granular, and crumb. (Example of soil structure grade, class, and type: Moderate, coarse, subangular blocky).

Subsoil. Technically, the B horizon of soils with distinct profiles; roughly, that part of the profile below plow depth.

Substratum. See also Horizon, soil; and Parent Material. Any layer lying beneath the solum, or true soil.

Surface soil. Technically, the A horizon; commonly, the upper part of the profile usually stirred by plowing.

Terrace, stream. Areas that lie above the present flood plain; they are generally underlain by stratified stream sediments.

Terracing. Construction of shallow, nearly level ditches with broad slopes that can be farmed. Terraces are needed on slopes to control runoff water.

Topography. (See Relief.)

Topsoil (engineering application). Presumably fertile soil material containing organic matter and suitable as a surfacing for shoulders and slopes.

Type, soil. Soils similar in kind, thickness, and arrangement of horizons and having essentially the same texture in the surface soil are classified as one soil type.

Upland. Land that lies above the stream terraces and that is underlain by bedrock at fairly shallow depths; generally, all areas not included in terraces and bottom lands.

Vesicular. Containing small openings or pores within the structural aggregates of a soil.

GUIDE TO MAPPING UNITS [1]

Map symbol	Soil	Page	Capability unit	Page
Aa	Alluvial land, poorly drained	12	Vw-15	38
Ab	Alluvial land	12	IIIw-14	35
Ar	Arenzville silt loam	12	IIw-11	33
BeA	Bertrand silt loam, 0 to 2 percent slopes	12	I-1	30
BeB	Bertrand silt loam, 2 to 6 percent slopes	12	IIe-1	31
BeB2	Bertrand silt loam, 2 to 6 percent slopes, moderately eroded	12	IIe-1	31
BeC2	Bertrand silt loam, 6 to 12 percent slopes, moderately eroded	12	IIIe-1	34
BoD	Boone fine sand, 12 to 30 percent slopes	12	VIIs-3	40
CaB	Chaseburg silt loam, 0 to 6 percent slopes	13	IIw-11	33
CaC	Chaseburg silt loam, 6 to 12 percent slopes	13	IIIe-11	35
ChC2	Chelsea fine sand, 6 to 12 percent slopes, eroded	13	VIIs-3	40
ChD2	Chelsea fine sand, 12 to 20 percent slopes, eroded	13	VIIs-3	40
ChE2	Chelsea fine sand, 20 to 30 percent slopes, eroded	13	VIIs-3	40
Ct	Cherty alluvial land	13	VIs-3	39
DaA	Dakota loam, 0 to 3 percent slopes	14	IIs-1a	32
DkA	Dakota sandy loam, 0 to 3 percent slopes	14	IIIs-2	35
DoB	Downs silt loam, 2 to 6 percent slopes	14	IIe-1	31
DoB2	Downs silt loam, 2 to 6 percent slopes, moderately eroded	14	IIe-1	31
DoC2	Downs silt loam, 6 to 12 percent slopes, moderately eroded	14	IIIe-1	34
DoD2	Downs silt loam, 12 to 20 percent slopes, moderately eroded	14	IVe-1	36
DtC	Dubuque cherty silt loam, 6 to 12 percent slopes	16	IVe-5	37
DtD	Dubuque cherty silt loam, 12 to 20 percent slopes	16	VIe-1	38
DtD2	Dubuque cherty silt loam, 12 to 20 percent slopes, moderately eroded	16	VIe-1	38
DtE	Dubuque cherty silt loam, 20 to 30 percent slopes	16	VIIe-1	39
DtE2	Dubuque cherty silt loam, 20 to 30 percent slopes, moderately eroded	16	VIIe-1	39
DuB2	Dubuque silt loam, 2 to 6 percent slopes, moderately eroded	15	IIe-2	31
DuC2	Dubuque silt loam, 6 to 12 percent slopes, moderately eroded	15	IIIe-2	34
DuD	Dubuque silt loam, 12 to 20 percent slopes	15	IVe-2	36
DuD2	Dubuque silt loam, 12 to 20 percent slopes, moderately eroded	15	IVe-2	36
DuE	Dubuque silt loam, 20 to 30 percent slopes	15	VIe-1	38
DuE2	Dubuque silt loam, 20 to 30 percent slopes, moderately eroded	15	VIe-1	38
DuF	Dubuque silt loam, 30 to 45 percent slopes	15	VIIe-1	39
DvB2	Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded	15	IIe-1	31
DvC	Dubuque silt loam, deep, 6 to 12 percent slopes	15	IIIe-1	34
DvC2	Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded	16	IIIe-1	34
DvD	Dubuque silt loam, deep, 12 to 20 percent slopes	16	IVe-1	36
DvD2	Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded	15	IVe-1	36
DvE	Dubuque silt loam, deep, 20 to 30 percent slopes	16	VIe-1	38
DvE2	Dubuque silt loam, deep, 20 to 30 percent slopes, moderately eroded	16	VIe-1	38
DwC3	Dubuque soils, 6 to 12 percent slopes, severely eroded	15	IVe-2	36
DwD3	Dubuque soils, 12 to 20 percent slopes, severely eroded	15	VIe-1	38
DxD3	Dubuque soils, deep, 12 to 20 percent slopes, severely eroded	16	VIe-1	38
Et	Ettrick silt loam	16	IIw-1a	33
FaB	Fayette silt loam, uplands, 2 to 6 percent slopes	17	IIe-1	31
FaB2	Fayette silt loam, uplands, 2 to 6 percent slopes, moderately eroded	17	IIe-1	31
FaC	Fayette silt loam, uplands, 6 to 12 percent slopes	17	IIIe-1	34
FaC2	Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded	17	IIIe-1	34
FaC3	Fayette silt loam, uplands, 6 to 12 percent slopes, severely eroded	17	IVe-1	36
FaD	Fayette silt loam, uplands, 12 to 20 percent slopes	17	IVe-1	36
FaD2	Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded	17	IVe-1	36
FaD3	Fayette silt loam, uplands, 12 to 20 percent slopes, severely eroded	17	VIe-1	38
FaE	Fayette silt loam, uplands, 20 to 30 percent slopes	17	VIe-1	38
FaE2	Fayette silt loam, uplands, 20 to 30 percent slopes, moderately eroded	18	VIe-1	38
FaE3	Fayette silt loam, uplands, 20 to 30 percent slopes, severely eroded	18	VIIe-1	39
FvB	Fayette silt loam, valleys, 2 to 6 percent slopes	18	IIe-1	31
FvC2	Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded	18	IIIe-1	34
FvD	Fayette silt loam, valleys, 12 to 20 percent slopes	18	IVe-1	36
FvD2	Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded	18	IVe-1	36
FvE	Fayette silt loam, valleys, 20 to 30 percent slopes	18	VIe-1	38
FvE2	Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded	18	VIe-1	38
FvF	Fayette silt loam, valleys, 30 to 45 percent slopes	18	VIIe-1	39
GaB2	Gale silt loam, 2 to 6 percent slopes, moderately eroded	18	IIe-2	31
GaC2	Gale silt loam, 6 to 12 percent slopes, moderately eroded	18	IIIe-2	34
GaD	Gale silt loam, 12 to 20 percent slopes	19	IVe-2	36
GaD2	Gale silt loam, 12 to 20 percent slopes, moderately eroded	18	IVe-2	36
GaE	Gale silt loam, 20 to 30 percent slopes	19	VIe-1	38
GaE2	Gale silt loam, 20 to 30 percent slopes, moderately eroded	19	VIe-1	38
GoB	Gotham loamy fine sand, 2 to 6 percent slopes	19	IVs-3	37
GoB2	Gotham loamy fine sand, 2 to 6 percent slopes, eroded	19	IVs-3	37
GoC	Gotham loamy fine sand, 6 to 12 percent slopes	20	VIs-3	39
GoC2	Gotham loamy fine sand, 6 to 12 percent slopes, eroded	19	VIs-3	39
Gu	Gullied land	20	VIIe-1	39
HeD	Hesch loam, 12 to 20 percent slopes	20	IVe-2	36

See footnote at end of table.

GUIDE TO MAPPING UNITS [1]—Continued

Map symbol	*Soil*	*Page*	*Capability unit*	*Page*
HeE2	Hesch loam, 20 to 30 percent slopes, moderately eroded	20	VIe-1	38
HsD2	Hesch sandy loam, 12 to 20 percent slopes, moderately eroded	20	VIe-1	38
HtC2	Hixton loam, 6 to 12 percent slopes, moderately eroded	21	IIIe-2	34
HtD	Hixton loam, 12 to 20 percent slopes	21	IVe-2	36
HtD2	Hixton loam, 12 to 20 percent slopes, moderately eroded	21	IVe-2	36
HtE	Hixton loam, 20 to 30 percent slopes	21	VIe-1	38
HtE2	Hixton loam, 20 to 30 percent slopes, moderately eroded	21	VIe-1	38
HuB	Hixton sandy loam, 2 to 6 percent slopes	21	IIIs-2	35
HuC2	Hixton sandy loam, 6 to 12 percent slopes, moderately eroded	21	IVe-3	37
HuD	Hixton sandy loam, 12 to 20 percent slopes	21	VIe-1	38
HuD2	Hixton sandy loam, 12 to 20 percent slopes, moderately eroded	20	VIe-1	38
HuE	Hixton sandy loam, 20 to 30 percent slopes	21	VIIe-1	39
HuE2	Hixton sandy loam, 20 to 30 percent slopes, moderately eroded	21	VIIe-1	39
HuF	Hixton sandy loam, 30 to 45 percent slopes	21	VIIe-1	39
HyD	Hixton stony loam, 12 to 20 percent slopes	21	VIs-3	39
HyE	Hixton stony loam, 20 to 30 percent slopes	21	VIIs-3	40
JaA	Jackson silt loam, 0 to 2 percent slopes	22	I-1	30
JaB	Jackson silt loam, 2 to 6 percent slopes	22	IIe-1	31
JaB2	Jackson silt loam, 2 to 6 percent slopes, moderately eroded	22	IIe-1	31
JcB	Judson cherty silt loam, 2 to 6 percent slopes	22	IIw-11	33
JcC	Judson cherty silt loam, 6 to 12 percent slopes	22	IIIe-11	35
JdB	Judson silt loam, 0 to 6 percent slopes	22	IIw-11	33
LsB	Lindstrom silt loam, 2 to 6 percent slopes	22	IIe-1	31
LsC	Lindstrom silt loam, 6 to 12 percent slopes	22	IIIe-1	34
LsC2	Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded	23	IIIe-1	34
LsD	Lindstrom silt loam, 12 to 20 percent slopes	23	IVe-1	36
LsD2	Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded	22	IVe-1	36
LsE2	Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded	23	VIe-1	38
MdA	Medary silt loam, 0 to 2 percent slopes	23	IIe-6a	32
MdB	Medary silt loam, 2 to 6 percent slopes	23	IIe-6b	32
MdC2	Medary silt loam, 6 to 12 percent slopes, moderately eroded	23	IIIe-6	34
MmA	Meridian loam, 0 to 2 percent slopes	24	IIs-1a	32
MmB	Meridian loam, 2 to 6 percent slopes	24	IIs-1b	32
MmB2	Meridian loam, 6 to 12 percent slopes, moderately eroded	23	IIIe-2	34
MsA	Meridian sandy loam, 0 to 2 percent slopes	23	IIIs-2	35
MsB	Meridian sandy loam, 2 to 6 percent slopes	23	IIIs-2	35
MsB2	Meridian sandy loam, 2 to 6 percent slopes, moderately eroded	23	IIIs-2	35
MsC2	Meridian sandy loam, 6 to 12 percent slopes, moderately eroded	23	IVe-3	37
NoD	Norden fine sandy loam, 12 to 20 percent slopes	24	IVe-7	37
NoE	Norden fine sandy loam, 20 to 30 percent slopes	24	VIe-1	38
NsD2	Norden fine sandy loam and loam, 12 to 20 percent slopes, moderately eroded.	24	IVe-7	37
NsE2	Norden fine sandy loam and loam, 20 to 30 percent slopes, moderately eroded.	24	VIe-1	38
NsF	Norden fine sandy loam and loam, 30 to 45 percent slopes	24	VIIe-1	39
Or	Orion silt loam	24	IIIw-14	35
Ow	Orion silt loam, poorly drained variant	24	Vw-15	38
RcA	Richwood silt loam, 0 to 2 percent slopes	25	I-1	30
RcB	Richwood silt loam, 2 to 6 percent slopes	25	IIe-1	31
RcC	Richwood silt loam, 6 to 12 percent slopes	25	IIIe-1	34
RoA	Rowley silt loam, 0 to 2 percent slopes	25	IIw-1a	33
RoB	Rowley silt loam, 2 to 6 percent slopes	25	IIw-1b	33
SeB2	Seaton silt loam, 2 to 6 percent slopes, moderately eroded	25	IIe-1	31
SeC2	Seaton silt loam, 6 to 12 percent slopes, moderately eroded	25	IIIe-1	34
SeD2	Seaton silt loam, 12 to 20 percent slopes, moderately eroded	25	IVe-1	36
SsA	Sparta loamy fine sand, 0 to 2 percent slopes	26	IVs-3	37
SsB	Sparta loamy fine sand, 2 to 6 percent slopes	26	IVs-3	37
SsB2	Sparta loamy fine sand, 2 to 6 percent slopes, eroded	26	IVs-3	37
SsC	Sparta loamy fine sand, 6 to 12 percent slopes	26	VIIs-3	40
SsC2	Sparta loamy fine sand, 6 to 12 percent slopes, eroded	26	VIIs-3	40
St	Steep stony and rocky land	26	VIIs-3	40
Su	Stony colluvial land	26	VIIs-3	40
TeA	Tell silt loam, 0 to 2 percent slopes	26	IIs-1a	32
TeB2	Tell silt loam, 2 to 6 percent slopes, moderately eroded	26	IIs-1b	32
TeC2	Tell silt loam, 6 to 12 percent slopes, moderately eroded	26	IIIe-2	34
TeD2	Tell silt loam, 12 to 20 percent slopes, moderately eroded	26	IVe-2	36
Tr	Terrace escarpments, loamy	27	VIe-1	38
Ts	Terrace escarpments, sandy	27	VIIs-3	40
TvA	Toddville silt loam, 0 to 2 percent slopes	27	I-1	30
TvB	Toddville silt loam, 2 to 6 percent slopes	27	IIe-1	31
Wa	Waukegan loam	27	IIs-1a	32

[1] Table 2, p. 10, shows the acreage and proportionate extent of the soils; table 3, p. 40, gives estimated crop yields; and facts about woodland uses of the soils are given in the section beginning on p. 44. To find the engineering properties of the soils, see section beginning on p. 44.

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If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

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If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

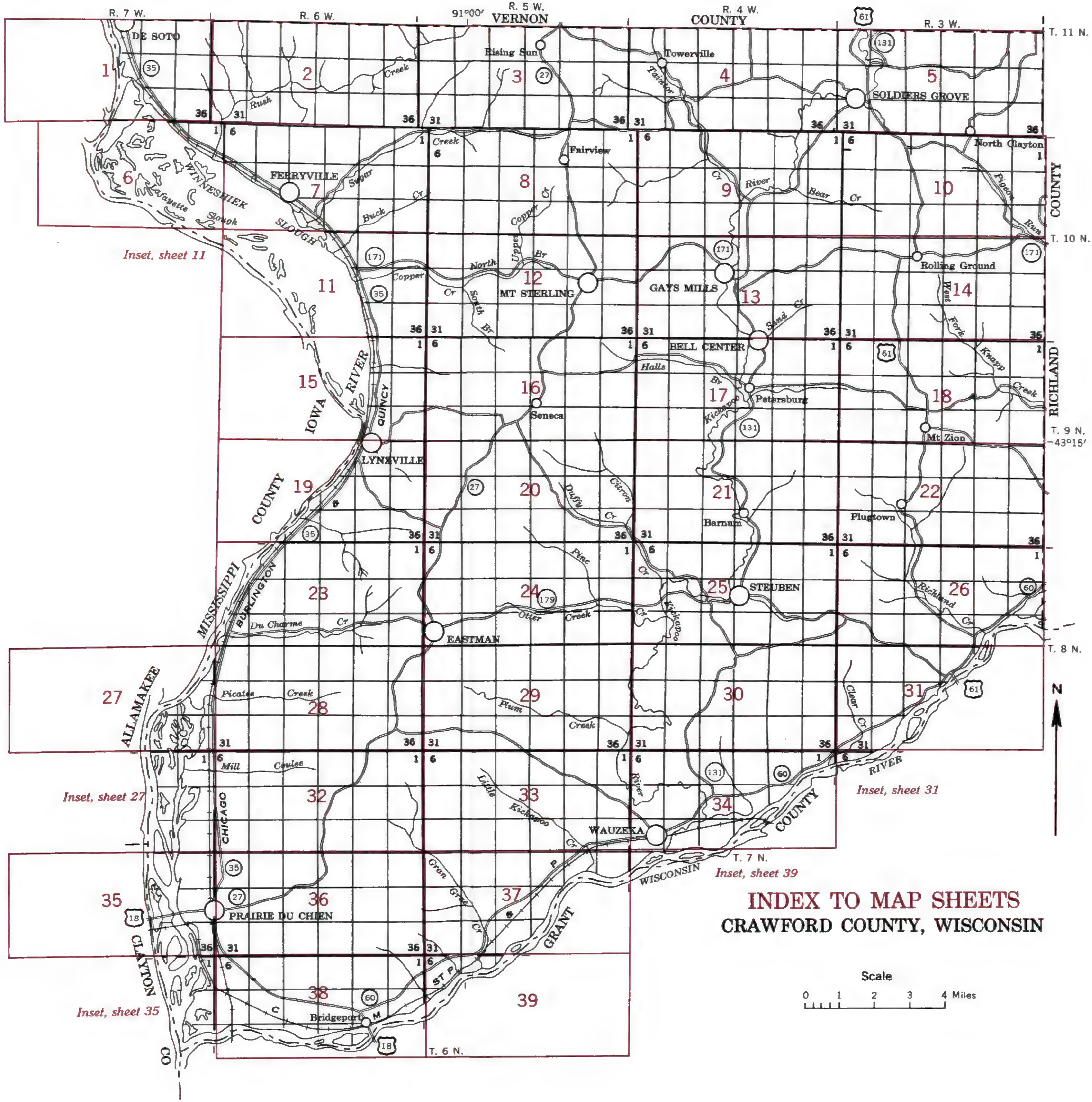
program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).



INDEX TO MAP SHEETS
CRAWFORD COUNTY, WISCONSIN
VERNON COUNTY
RICHLAND COUNTY
GRANT COUNTY
ALLAMAKEE COUNTY
CLAYTON CO
IOWA
MISSISSIPPI RIVER
WISCONSIN RIVER
R. 7 W.
R. 6 W.
R. 5 W.
R. 4 W.
R. 3 W.
T. 11 N.
T. 10 N.
T. 9 N.
T. 8 N.
T. 7 N.
T. 6 N.
91°00′
43°15′
DE SOTO
Rising Sun
Towerville
SOLDIERS GROVE
North Clayton
Fairview
FERRYVILLE
MT STERLING
GAYS MILLS
Rolling Ground
BELL CENTER
Petersburg
Seneca
Mt Zion
LYNXVILLE
Barnum
Plugtown
STEUBEN
EASTMAN
WAUZEKA
PRAIRIE DU CHIEN
Bridgeport
Inset, sheet 11
Inset, sheet 27
Inset, sheet 31
Inset, sheet 35
Inset, sheet 39
Scale
0 1 2 3 4 Miles
N

SOIL LEGEND

The first letter in each soil symbol is the initial of the soil series name. If slope forms part of the soil name, a second capital letter shows the range of steepness. A number shows that the soil is eroded.

SYMBOL	NAME
Aa	Alluvial land, poorly drained
Ab	Alluvial land
Ar	Arenzville silt loam
BeA	Bertrand silt loam, 0 to 2 percent slopes
BeB	Bertrand silt loam, 2 to 6 percent slopes
BeB2	Bertrand silt loam, 2 to 6 percent slopes, moderately eroded
BeC2	Bertrand silt loam, 6 to 12 percent slopes, moderately eroded
BoD	Boone fine sand, 12 to 30 percent slopes
CaB	Chaseburg silt loam, 0 to 6 percent slopes
CaC	Chaseburg silt loam, 6 to 12 percent slopes
ChC2	Chelsea fine sand, 6 to 12 percent slopes, eroded
ChD2	Chelsea fine sand, 12 to 20 percent slopes, eroded
ChE2	Chelsea fine sand, 20 to 30 percent slopes, eroded
Ct	Cherty alluvial land
DaA	Dakota loam, 0 to 3 percent slopes
DkA	Dakota sandy loam, 0 to 3 percent slopes
DoB	Downs silt loam, 2 to 6 percent slopes
DoB2	Downs silt loam, 2 to 6 percent slopes, moderately eroded
DoC2	Downs silt loam, 6 to 12 percent slopes, moderately eroded
DoD2	Downs silt loam, 12 to 20 percent slopes, moderately eroded
DtC	Dubuque cherty silt loam, 6 to 12 percent slopes
DtD	Dubuque cherty silt loam, 12 to 20 percent slopes
DtD2	Dubuque cherty silt loam, 12 to 20 percent slopes, moderately eroded
DtE	Dubuque cherty silt loam, 20 to 30 percent slopes
DtE2	Dubuque cherty silt loam, 20 to 30 percent slopes, moderately eroded
DuB2	Dubuque silt loam, 2 to 6 percent slopes, moderately eroded
DuC2	Dubuque silt loam, 6 to 12 percent slopes, moderately eroded
DuD	Dubuque silt loam, 12 to 20 percent slopes
DuD2	Dubuque silt loam, 12 to 20 percent slopes, moderately eroded
DuE	Dubuque silt loam, 20 to 30 percent slopes
DuE2	Dubuque silt loam, 20 to 30 percent slopes, moderately eroded
DuF	Dubuque silt loam, 30 to 45 percent slopes
DvB2	Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded
DvC	Dubuque silt loam, deep, 6 to 12 percent slopes
DvC2	Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded
DvD	Dubuque silt loam, deep, 12 to 20 percent slopes
DvD2	Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded
DvE	Dubuque silt loam, deep, 20 to 30 percent slopes
DvE2	Dubuque silt loam, deep, 20 to 30 percent slopes, moderately eroded
DwC3	Dubuque soils, 6 to 12 percent slopes, severely eroded
DwD3	Dubuque soils, 12 to 20 percent slopes, severely eroded
DxD3	Dubuque soils, deep, 12 to 20 percent slopes, severely eroded
Et	Ettrick silt loam
FaB	Fayette silt loam, uplands, 2 to 6 percent slopes
FaB2	Fayette silt loam, uplands, 2 to 6 percent slopes, moderately eroded
FaC	Fayette silt loam, uplands, 6 to 12 percent slopes
FaC2	Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded
FaC3	Fayette silt loam, uplands, 6 to 12 percent slopes, severely eroded
FaD	Fayette silt loam, uplands, 12 to 20 percent slopes
FaD2	Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded
FaD3	Fayette silt loam, uplands, 12 to 20 percent slopes, severely eroded
FaE	Fayette silt loam, uplands, 20 to 30 percent slopes
FaE2	Fayette silt loam, uplands, 20 to 30 percent slopes, moderately eroded
FaE3	Fayette silt loam, uplands, 20 to 30 percent slopes, severely eroded
FvB	Fayette silt loam, valleys, 2 to 6 percent slopes
FvC2	Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded
FvD	Fayette silt loam, valleys, 12 to 20 percent slopes
FvD2	Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded
FvE	Fayette silt loam, valleys, 20 to 30 percent slopes
FvE2	Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded
FvF	Fayette silt loam, valleys, 30 to 45 percent slopes
GaB2	Gale silt loam, 2 to 6 percent slopes, moderately eroded
GaC2	Gale silt loam, 6 to 12 percent slopes, moderately eroded
GaD	Gale silt loam, 12 to 20 percent slopes
GaD2	Gale silt loam, 12 to 20 percent slopes, moderately eroded
GaE	Gale silt loam, 20 to 30 percent slopes
GaE2	Gale silt loam, 20 to 30 percent slopes, moderately eroded
GoB	Gotham loamy fine sand, 2 to 6 percent slopes
GoB2	Gotham loamy fine sand, 2 to 6 percent slopes, eroded
GoC	Gotham loamy fine sand, 6 to 12 percent slopes
GoC2	Gotham loamy fine sand, 6 to 12 percent slopes, eroded
Gu	Gullied land
HeD	Hesch loam, 12 to 20 percent slopes
HeE2	Hesch loam, 20 to 30 percent slopes, moderately eroded
HsD2	Hesch sandy loam, 12 to 20 percent slopes, moderately eroded
HtC2	Hixton loam, 6 to 12 percent slopes, moderately eroded
HtD	Hixton loam, 12 to 20 percent slopes
HtD2	Hixton loam, 12 to 20 percent slopes, moderately eroded
HtE	Hixton loam, 20 to 30 percent slopes
HtE2	Hixton loam, 20 to 30 percent slopes, moderately eroded
HuB	Hixton sandy loam, 2 to 6 percent slopes
HuC2	Hixton sandy loam, 6 to 12 percent slopes, moderately eroded
HuD	Hixton sandy loam, 12 to 20 percent slopes
HuD2	Hixton sandy loam, 12 to 20 percent slopes, moderately eroded
HuE	Hixton sandy loam, 20 to 30 percent slopes
HuE2	Hixton sandy loam, 20 to 30 percent slopes, moderately eroded
HuF	Hixton sandy loam, 30 to 45 percent slopes
HyD	Hixton stony loam, 12 to 20 percent slopes
HyE	Hixton stony loam, 20 to 30 percent slopes
JaA	Jackson silt loam, 0 to 2 percent slopes
JaB	Jackson silt loam, 2 to 6 percent slopes
JaB2	Jackson silt loam, 2 to 6 percent slopes, moderately eroded
JcB	Judson cherty silt loam, 2 to 6 percent slopes
JcC	Judson cherty silt loam, 6 to 12 percent slopes
JdB	Judson silt loam, 0 to 6 percent slopes
LsB	Lindstrom silt loam, 2 to 6 percent slopes
LsC	Lindstrom silt loam, 6 to 12 percent slopes
LsC2	Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded
LsD	Lindstrom silt loam, 12 to 20 percent slopes
LsD2	Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded
LsE2	Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded
MdA	Medary silt loam, 0 to 2 percent slopes
MdB	Medary silt loam, 2 to 6 percent slopes
MdC2	Medary silt loam, 6 to 12 percent slopes, moderately eroded
MmA	Meridian loam, 0 to 2 percent slopes
MmB	Meridian loam, 2 to 6 percent slopes
MmB2	Meridian loam, 6 to 12 percent slopes, moderately eroded
MsA	Meridian sandy loam, 0 to 2 percent slopes
MsB	Meridian sandy loam, 2 to 6 percent slopes
MsB2	Meridian sandy loam, 2 to 6 percent slopes, moderately eroded
MsC2	Meridian sandy loam, 6 to 12 percent slopes, moderately eroded
NoD	Norden fine sandy loam, 12 to 20 percent slopes
NoE	Norden fine sandy loam, 20 to 30 percent slopes
NsD2	Norden fine sandy loam and loam, 12 to 20 percent slopes, moderately eroded
NsE2	Norden fine sandy loam and loam, 20 to 30 percent slopes, moderately eroded
NsF	Norden fine sandy loam and loam, 30 to 45 percent slopes
Or	Orion silt loam
Ow	Orion silt loam, poorly drained variant
RcA	Richwood silt loam, 0 to 2 percent slopes
RcB	Richwood silt loam, 2 to 6 percent slopes
RcC	Richwood silt loam, 6 to 12 percent slopes
RoA	Rowley silt loam, 0 to 2 percent slopes
RoB	Rowley silt loam, 2 to 6 percent slopes
SeB2	Seaton silt loam, 2 to 6 percent slopes, moderately eroded
SeC2	Seaton silt loam, 6 to 12 percent slopes, moderately eroded
SeD2	Seaton silt loam, 12 to 20 percent slopes, moderately eroded
SsA	Sparta loamy fine sand, 0 to 2 percent slopes
SsB	Sparta loamy fine sand, 2 to 6 percent slopes
SsB2	Sparta loamy fine sand, 2 to 6 percent slopes, eroded
SsC	Sparta loamy fine sand, 6 to 12 percent slopes
SsC2	Sparta loamy fine sand, 6 to 12 percent slopes, eroded
St	Steep stony and rocky land
Su	Stony colluvial land
TeA	Tell silt loam, 0 to 2 percent slopes
TeB2	Tell silt loam, 2 to 6 percent slopes, moderately eroded
TeC2	Tell silt loam, 6 to 12 percent slopes, moderately eroded
TeD2	Tell silt loam, 12 to 20 percent slopes, moderately eroded
Tr	Terrace escarpments, loamy
Ts	Terrace escarpments, sandy
TvA	Toddville silt loam, 0 to 2 percent slopes
TvB	Toddville silt loam, 2 to 6 percent slopes
Wa	Waukegan loam

Soil map constructed 1960 by Cartographic Division, Soil Conservation Service, USDA, from 1954 aerial photographs. Controlled mosaic based on Wisconsin plane coordinate system, south zone, Lambert conformal conic projection, 1927 North American datum.

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail, foot
- Railroad
- Ferries
- Ford
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings
- School
- Church
- Station

Mines and Quarries

Mine dump

Pits, gravel or other

Power lines

Pipe lines

Cemeteries

Dams

Levees

Tanks

Creamery

Canal locks (point upstream)

BOUNDARIES

- National or state
- County
- Township, U. S.
- Section line, corner
- Reservation
- Land grant

DRAINAGE

Streams
- Perennial
- Intermittent, unclass.

Canals and ditches — CANAL, DITCH

Lakes and ponds
- Perennial
- Intermittent

Wells — flowing

Springs

Marsh

Wet spot

RELIEF

Escarpments
- Bedrock
- Other

Prominent peaks

Depressions — Large, Small
- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

Soil boundary and symbol — Dx

Gravel

Stones

Rock outcrops

Chert fragments

Clay spot

Sand spot

Gumbo or scabby spot

Made land

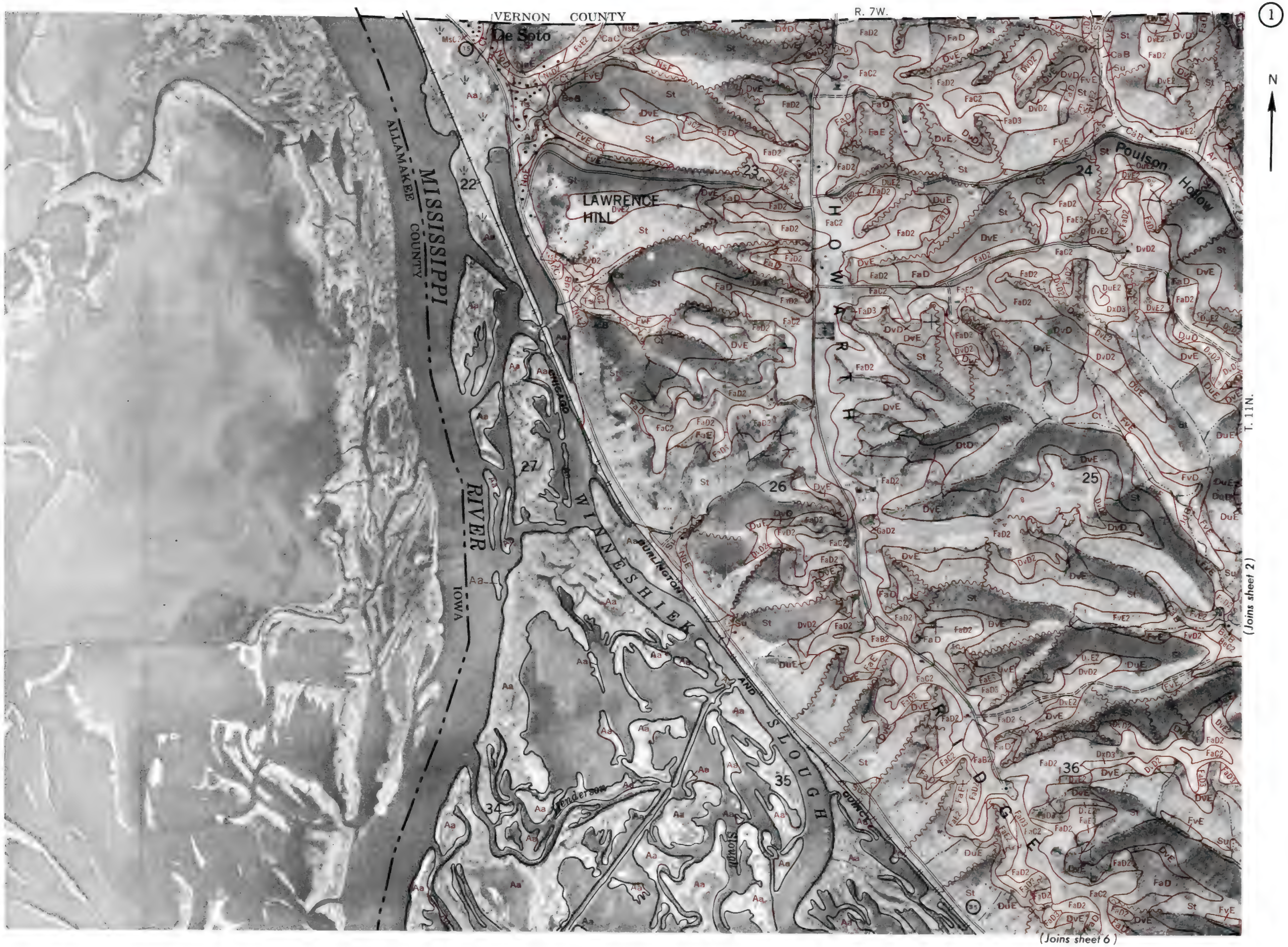
Severely eroded spot

Detrimental deposit

Gullies
- Crossable with tillage implements
- Not crossable with tillage implements

CRAWFORD COUNTY, WISCONSIN—SHEET NUMBER 1

1



0 ½ 1 Mile Scale 1:20000 0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1959.

Range, township, and section corners shown on this map are indefinite.

(Joins sheet 6) | (Joins sheet 7)

0 ½ 1 Mile Scale 1:20000 0 5000 Feet

CRAWFORD COUNTY, WISCONSIN—SHEET NUMBER 3

(Joins sheet 7) | (Joins sheet 8)

0 ½ 1 Mile Scale 1:20000 0 5000 Feet

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CRAWFORD COUNTY, WISCONSIN—SHEET NUMBER 4

0 1/2 1 Mile Scale 1:20 000 0 5000 Feet

CRAWFORD COUNTY, WISCONSIN—SHEET NUMBER 5

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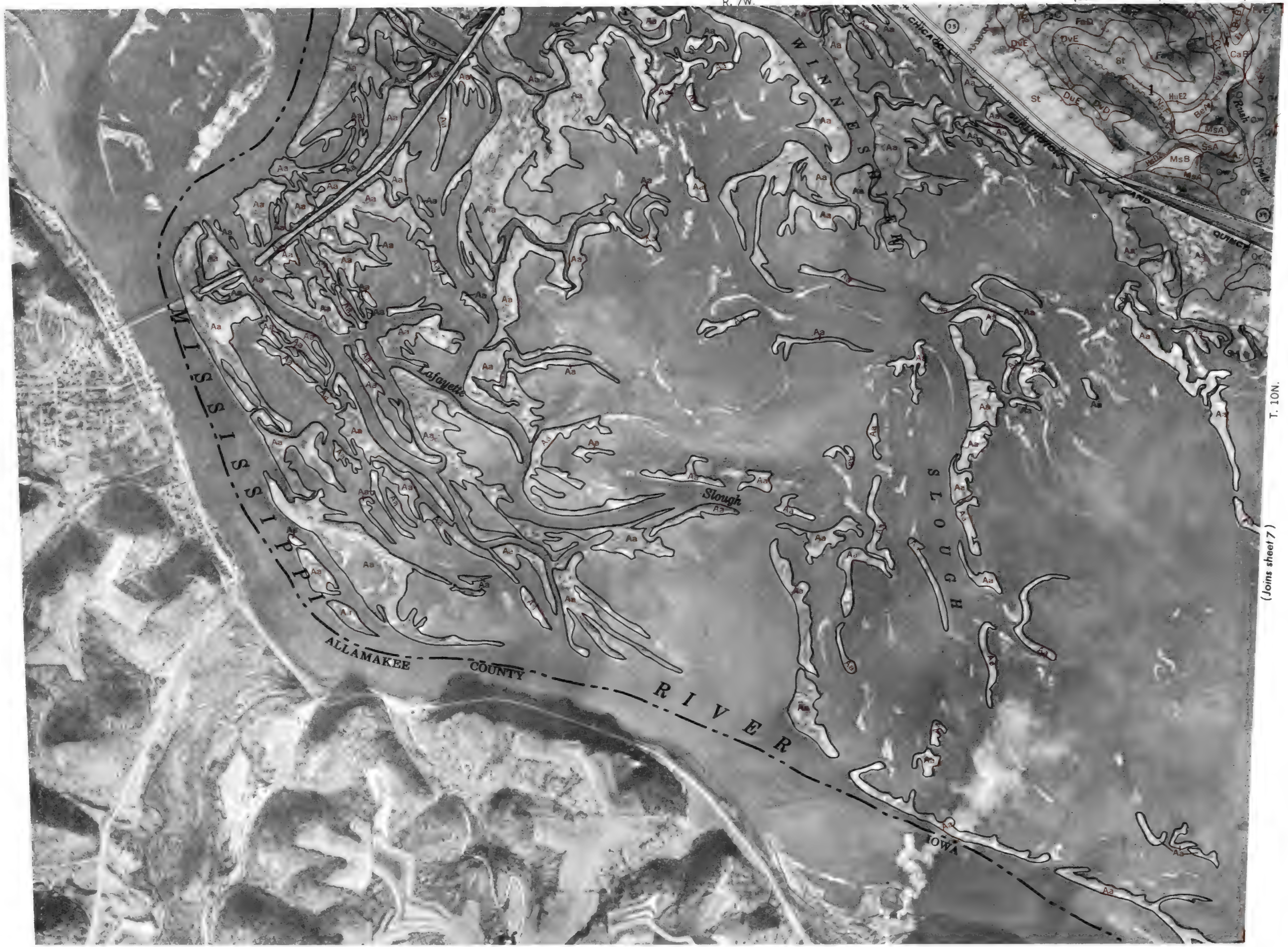
0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

6

N



0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

CRAWFORD COUNTY, WISCONSIN—SHEET NUMBER 7

R. 6W.

(Joins sheet 2) | (Sheet 3)

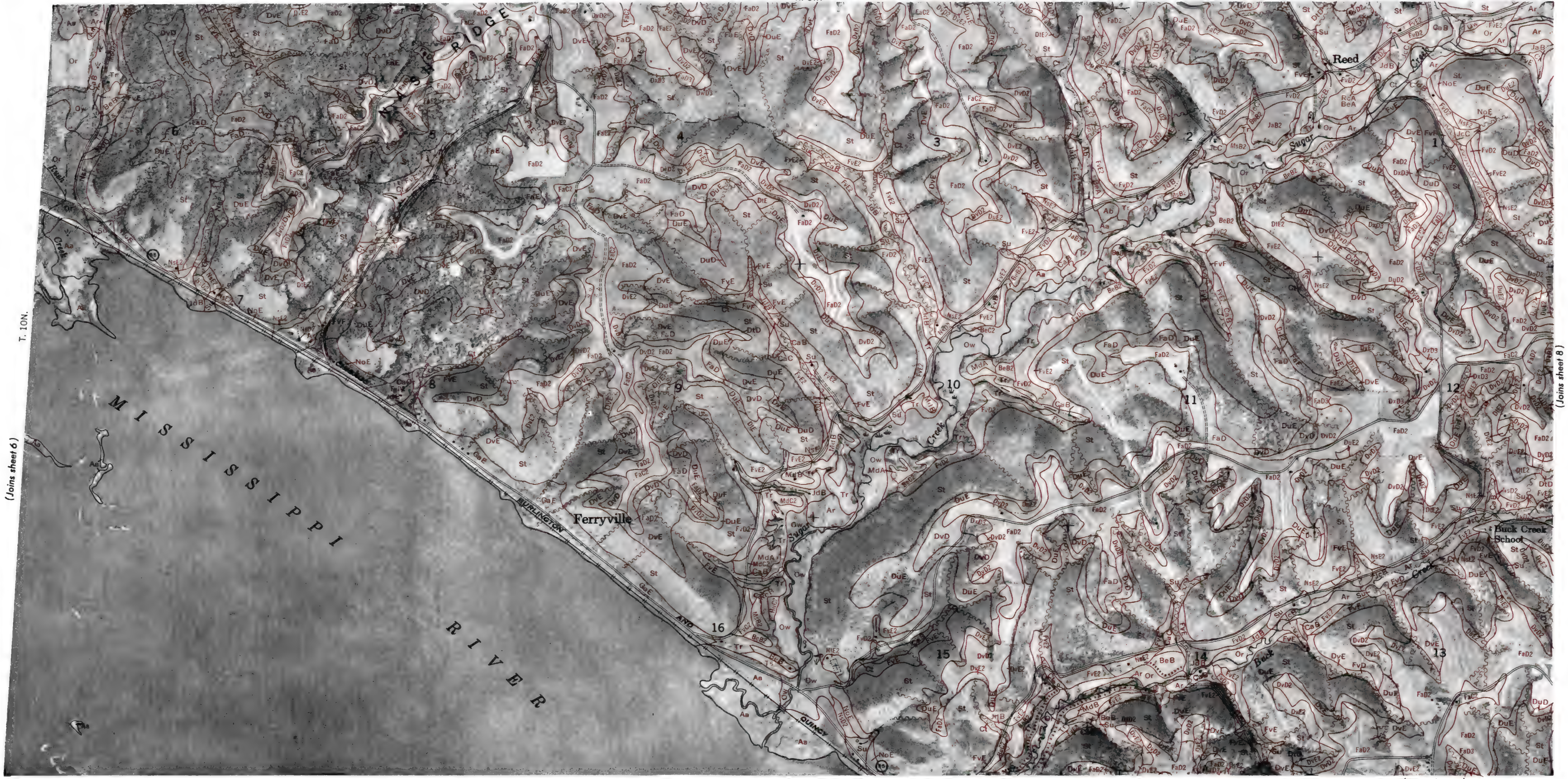
7

N

T. 10N.

(Joins sheet 6)

(Joins sheet 8)



(Joins sheet 11)

0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

8

R. 5W.

(Joins sheet 3) | (Sheet 4)

(Joins sheet 7)

(Joins sheet 9)

(Joins sheet 12)

Scale 1:20 000

0 ½ 1 Mile

0 5000 Feet

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Range, township, and section corners shown on this map are indefinite.

(10)

(Joins sheet 5)

(Joins sheet 14)

Scale 1:20000

0 ½ 1 Mile

0 5000 Feet

11

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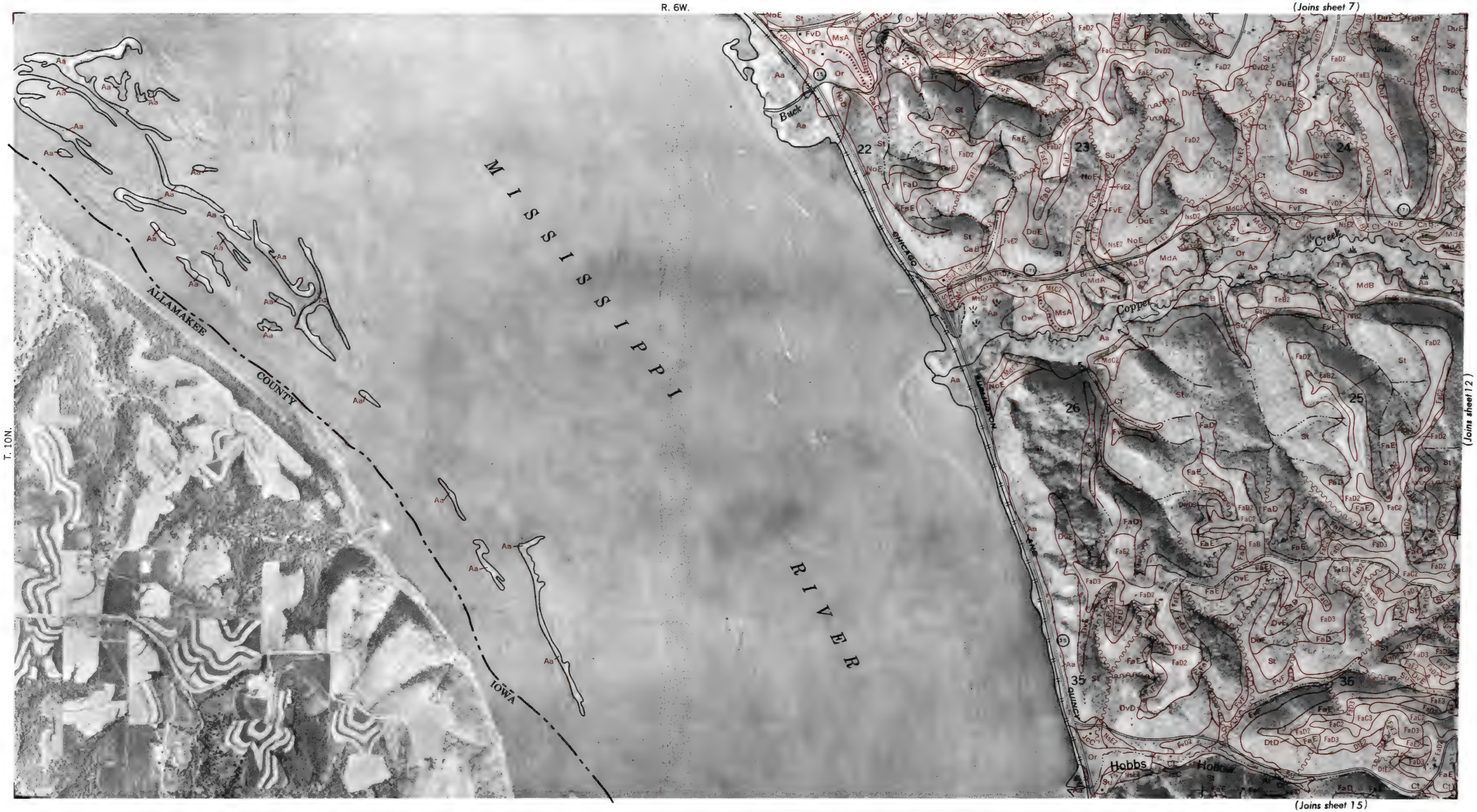

0 ½ 1 Mile Scale 1:20000 0 5000 Feet

12

0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

R. 4W.

(Joins sheet 9)

T. 10N.

(Joins sheet 12)

(Joins sheet 14)

(Joins sheet 17)

0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

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Range, township, and section corners shown on this map are indefinite.

14

(Joins sheet 10)

R. 3W.

N

(Joins sheet 13)

T. 10N.

RICHLAND COUNTY

(Joins sheet 18)

0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

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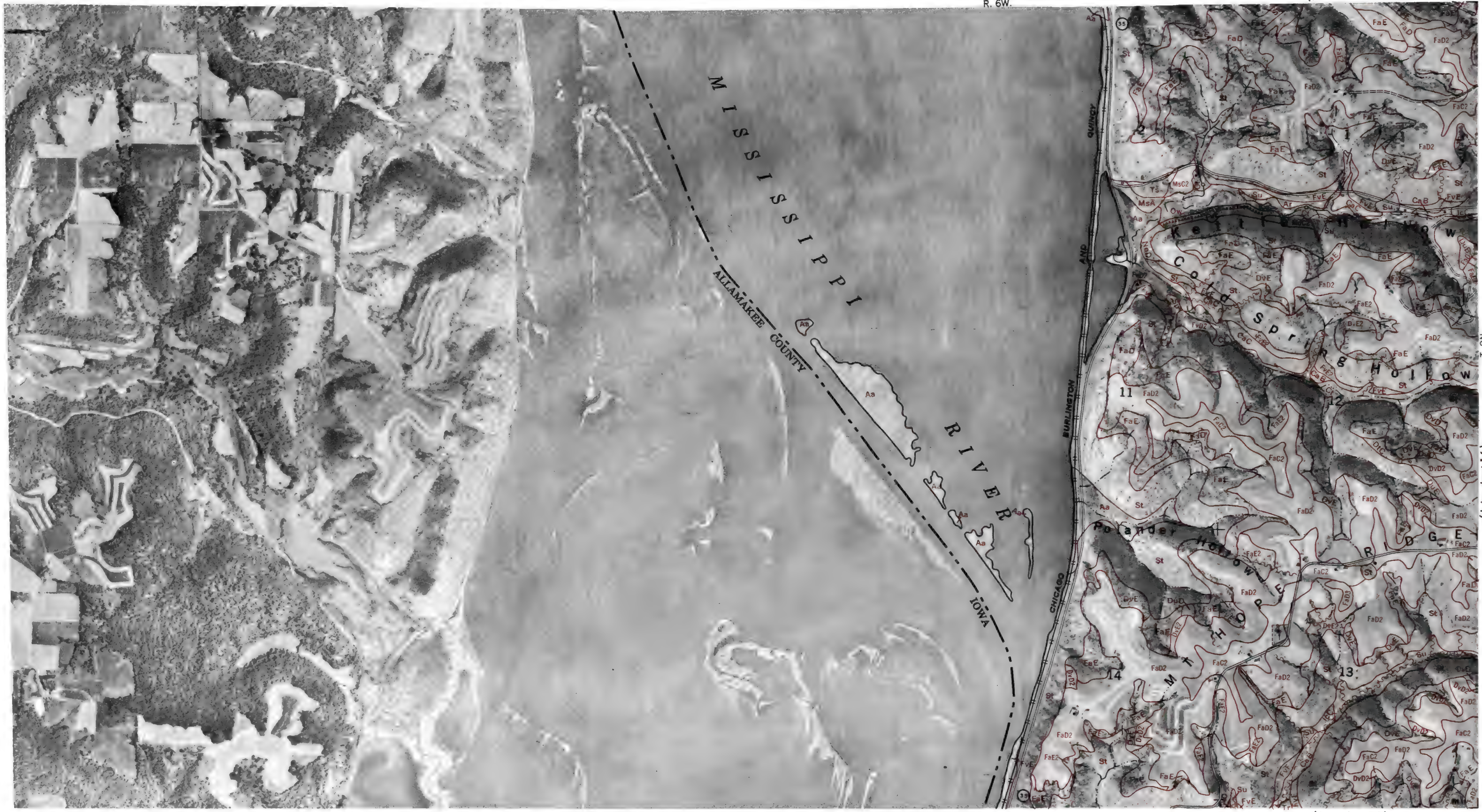

0 ½ 1 Mile Scale 1:20000 0 5000 Feet

CRAWFORD COUNTY, WISCONSIN—SHEET NUMBER 16

0 1/2 1 Mile Scale 1:20000 0 5000 Feet

17

R. 4W.

(Joins sheet 13)

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Range, township, and section corners shown on this map are indefinite.

T. 9N.

(Joins sheet 16)

(Joins sheet 18)

(Joins sheet 21)

N

0 1/2 1 Mile Scale 1:20000 0 5000 Feet

(18)

0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

CRAWFORD COUNTY, WISCONSIN—SHEET NUMBER 19

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Range, township, and section corners shown on this map are indefinite.

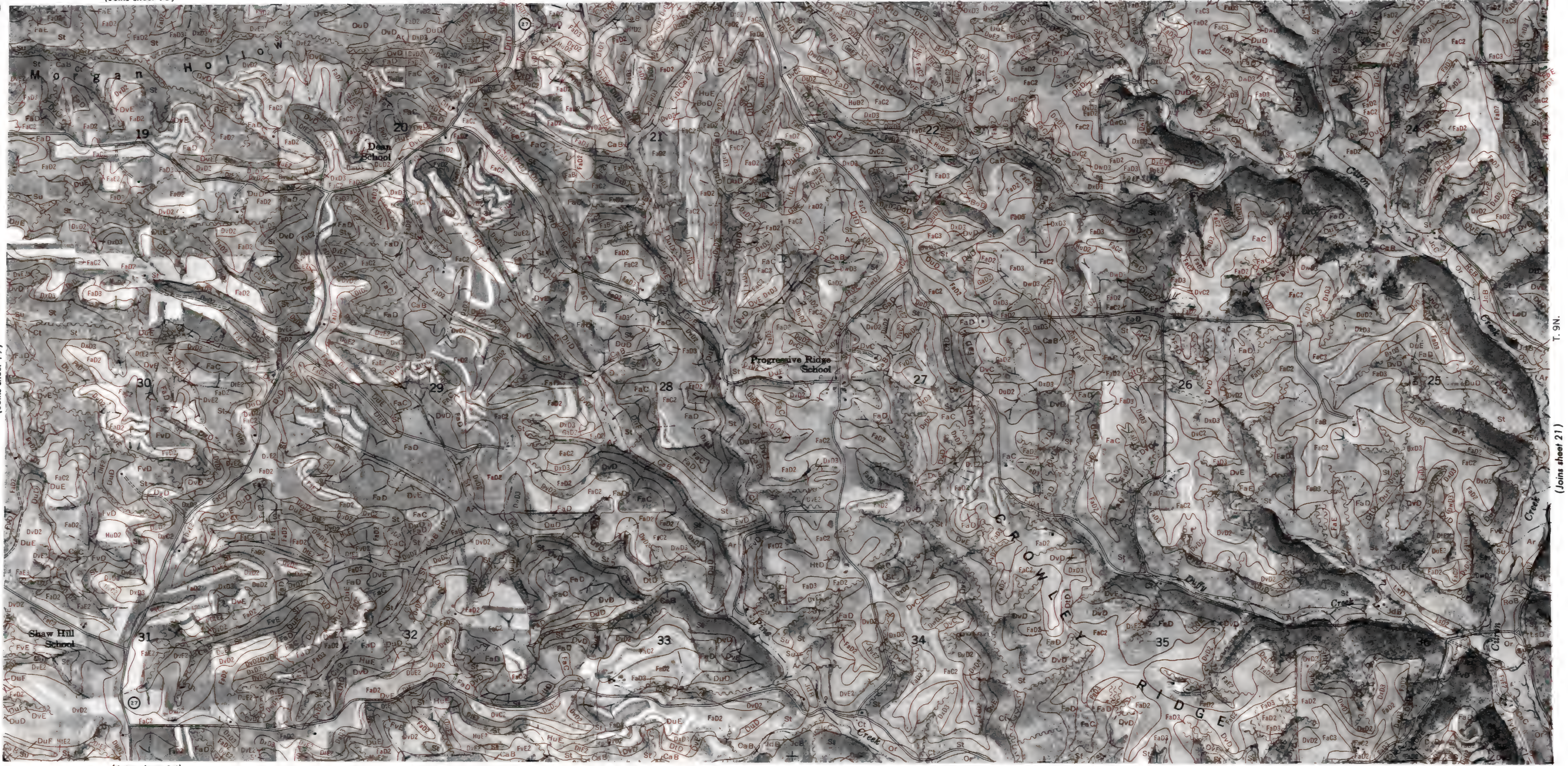
0 ½ 1 Mile Scale 1:20000 0 5000 Feet

(Joins sheet 16)

R. 5W.

N

(Joins sheet 19)



T. 9N.

(Joins sheet 21)

(Joins sheet 24)

0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

Range, township, and section corners shown on this map are indefinite.

0 ½ 1 Mile Scale 1:20000 0 5000 Feet


22
(Joins sheet 18)
R. 3W.
N
Coalburn School
Hulbert School
19
20
21
22
23
GRAHAM HOLLOW
Childs Hollow
Richland
30
29
28
27
26
25
IRISH RIDGE
White School
Plugtown
Crnk
31
32
33
34
35
36
Harmony Hill
(Joins sheet 21)
T. 9N.
RICHLAND COUNTY
(Joins sheet 26)
0
1/2
1 Mile
Scale 1:20000
0
5000 Feet

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0 ½ 1 Mile Scale 1:20000 0 5000 Feet

CRAWFORD COUNTY, WISCONSIN—SHEET NUMBER 24

(24)

(Joins sheet 20)

(Joins sheet 29)

Scale 1:20 000

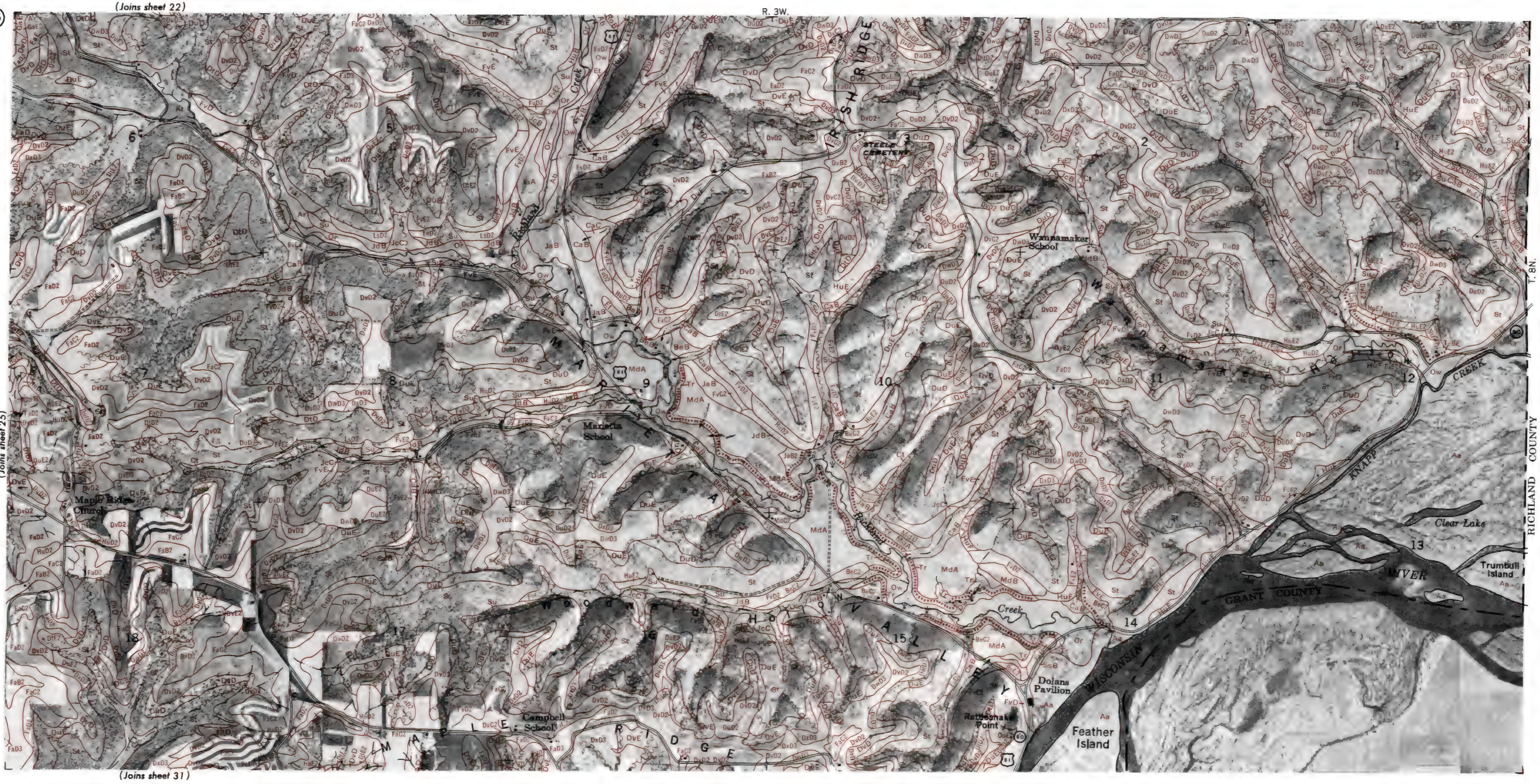
0 1/2 1 Mile

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1959.

Range, township, and section corners shown on this map are indefinite.

26



0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

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0 ½ 1 Mile Scale 1:20000 0 5000 Feet

28

(Joins sheet 23)

R. 6W.

(Joins sheet 27)

(Joins sheet 29)

(Joins sheet 32)

0 ½ 1 Mile Scale 1:20000 0 5000 Feet

Scale 1:20 000

0 ½ 1 Mile

0 5000 Feet

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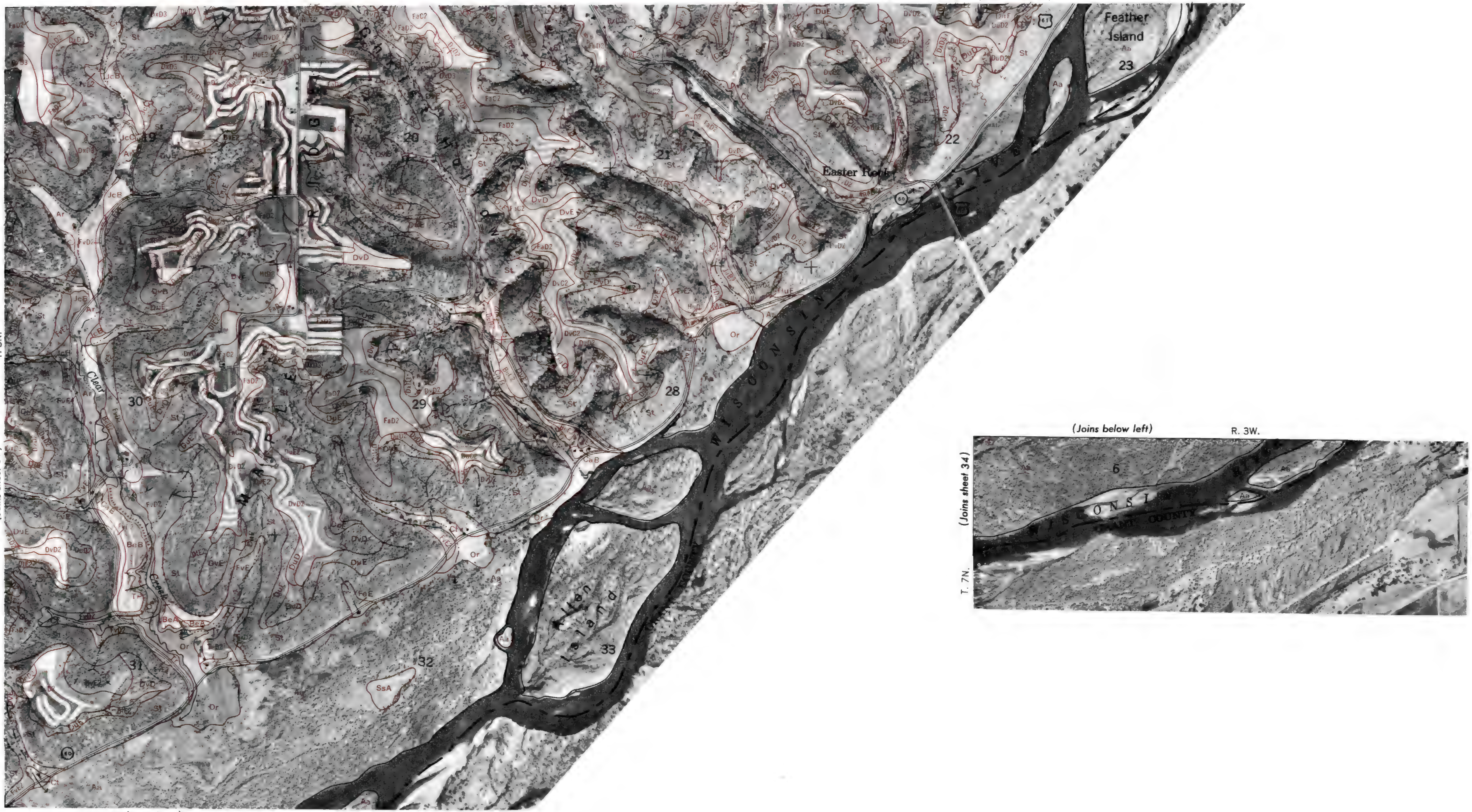
Range, township, and section corners shown on this map are indefinite.

R. 3W. (Joins sheet 26)

T. 8N.

(Joins sheet 30)



(Joins inset)

N

0 ½ 1 Mile Scale 1:20000 0 5000 Feet

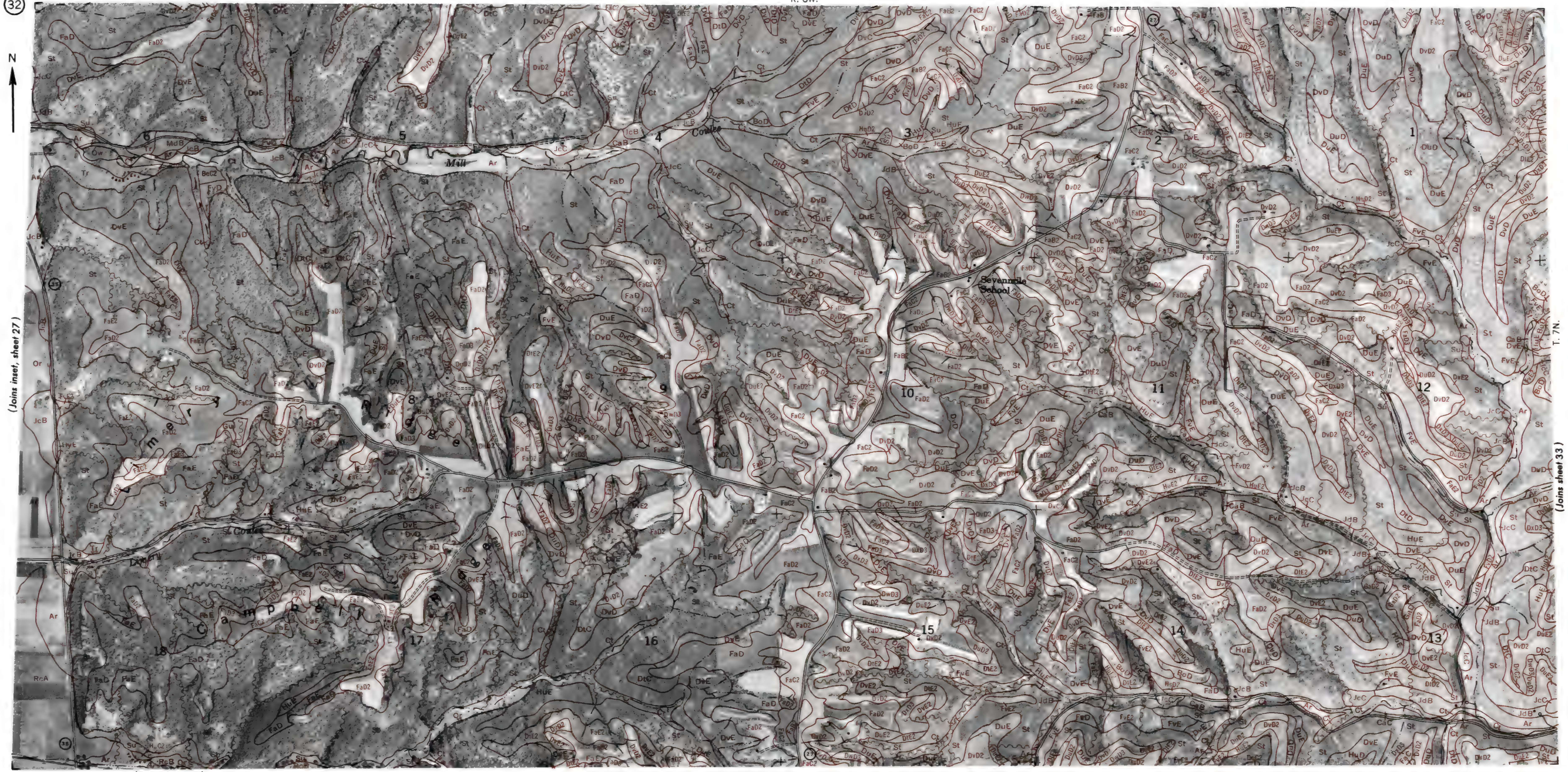
32

(Joins sheet 28)

R. 6W.

N

(Joins inset, sheet 27)



T. 7N.

(Joins sheet 33)

(Joins sheet 36)

0 ½ 1 Mile

Scale 1:20 000

0 5000 Feet

R. 5W.

(Joins sheet 29)

33

N

T. 7N.

(Joins sheet 32)

(Joins sheet 34)

(Joins sheet 37)

0 1/2 1 Mile Scale 1:20 000 0 5000 Feet

34

(Joins sheet 30)

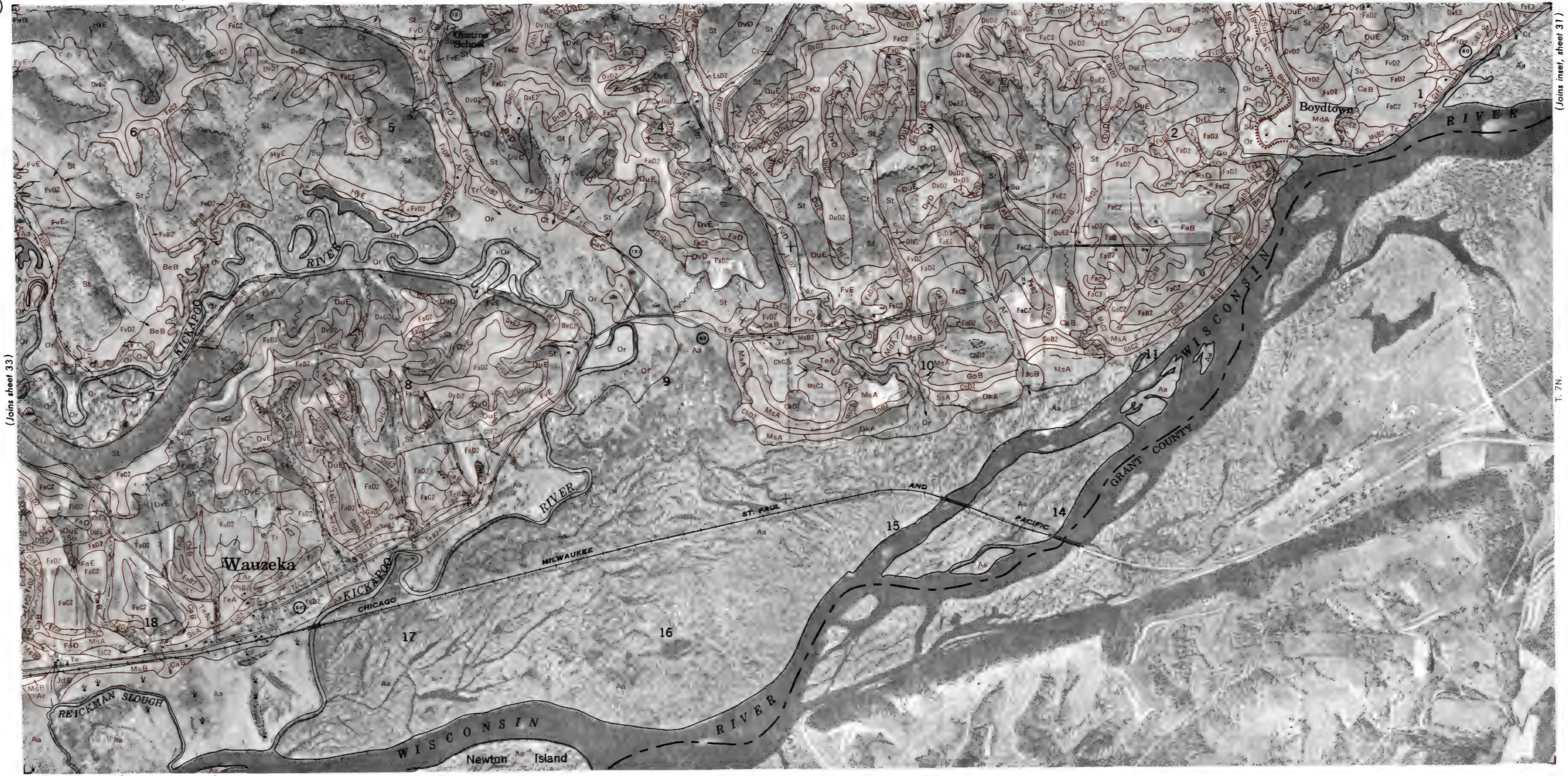
R. 4W.

N

(Joins sheet 33)

(Joins inset, sheet 31)

T. 7N.



(Joins inset, sheet 39)

0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the completed soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1959.

Range, township, and section corners shown on this map are indefinite.

R. 7W. (Joins below right)

T. 6N.

(Joins sheet 38)

R. 7W. (Joins inset, sheet 27)

35

N

T. 7N.

(Joins sheet 36)

(Joins above left)

0 ½ 1 Mile Scale 1:20000 0 5000 Feet

0 1/2 1 Mile Scale 1:20 000 0 5000 Feet

CRAWFORD COUNTY, WISCONSIN—SHEET NUMBER 37

R. 5W.

(Joins sheet 33)

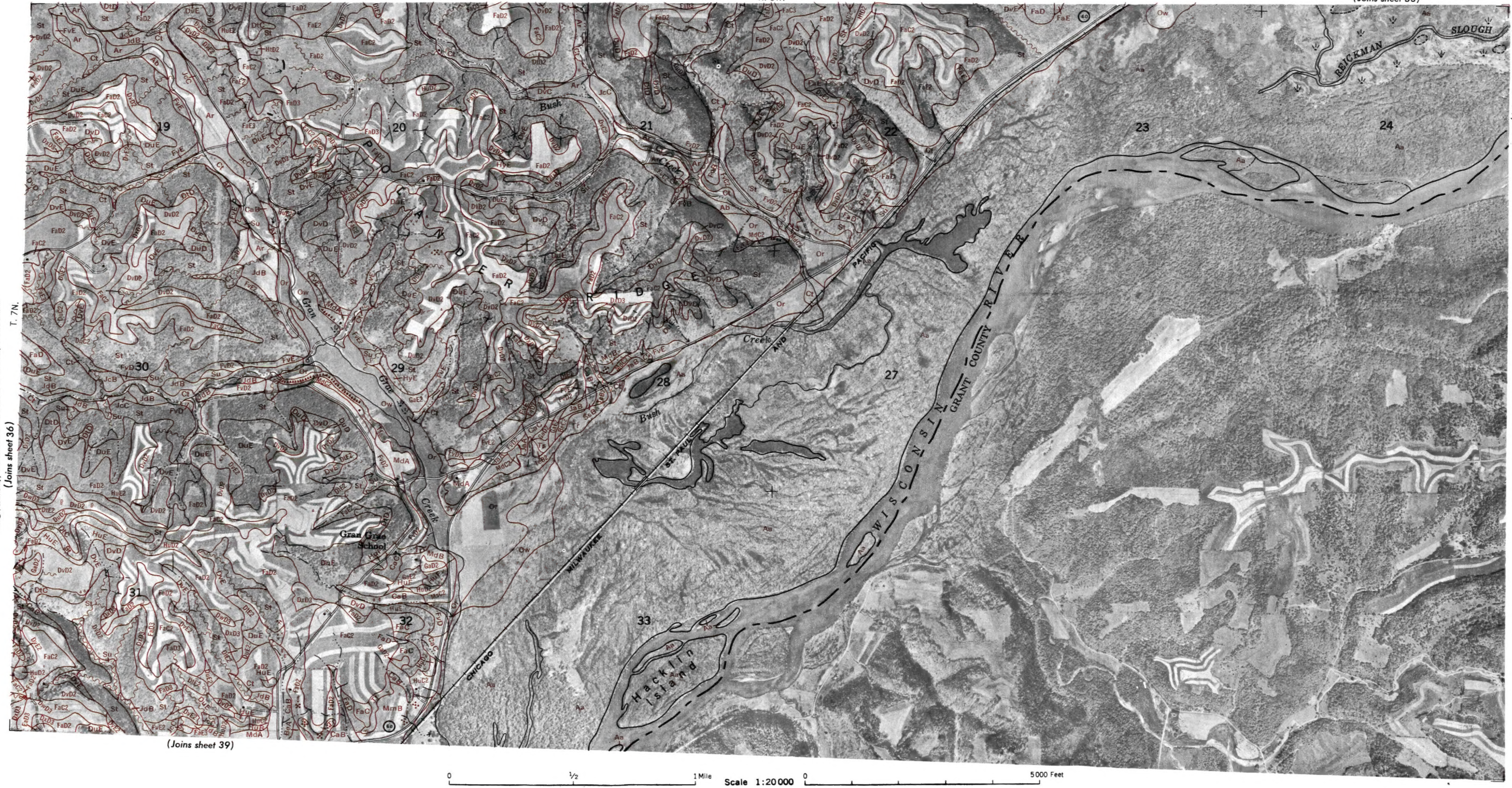
37

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1959.

Range, township, and section corners shown on this map are indefinite.

T. 7N.

(Joins sheet 36)



(Joins sheet 39)

0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

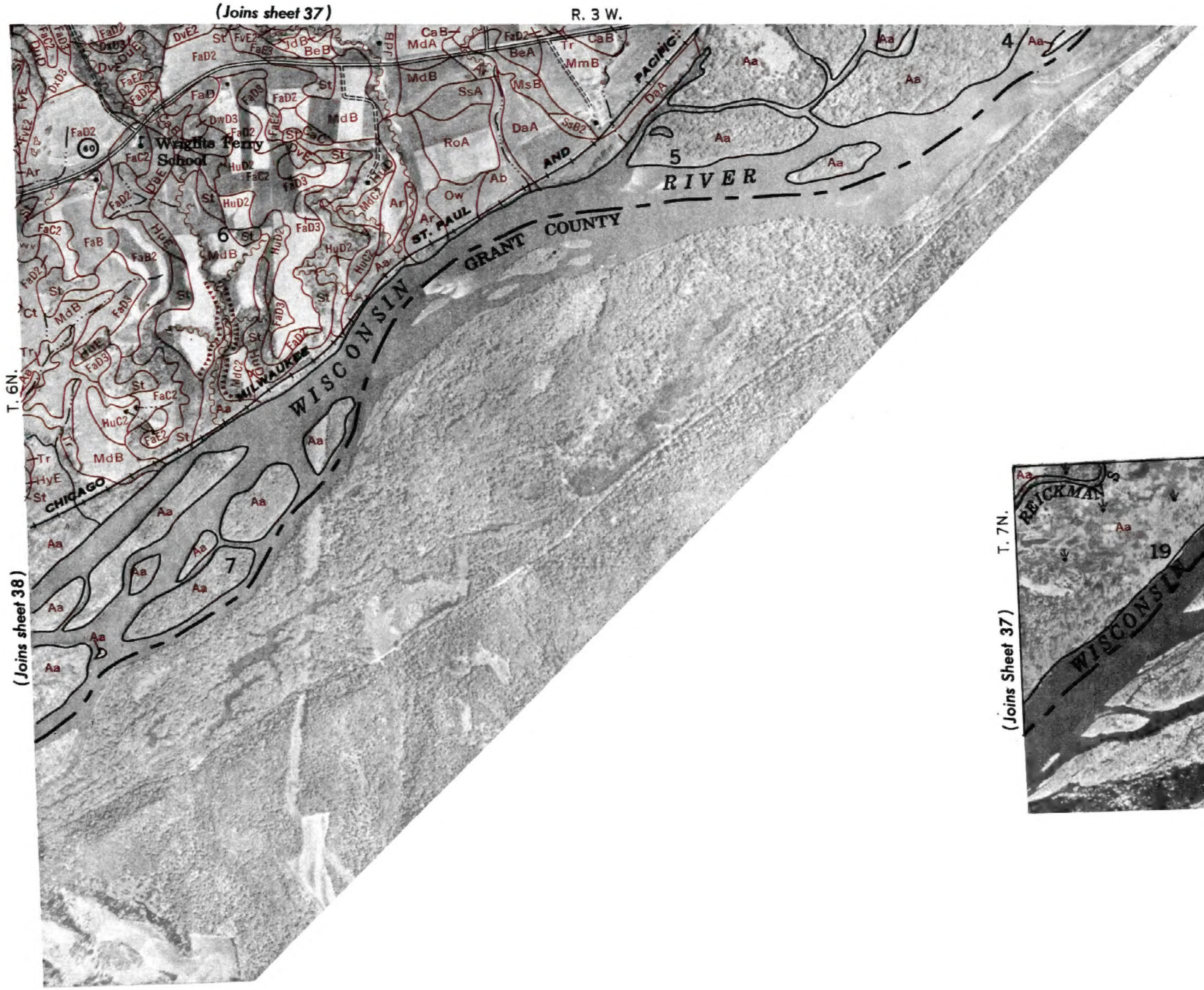
38

(Joins sheet 36)

R.6.W.

0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

N



This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1959.

Range, township, and section corners shown on this map are indefinite.

0 ½ 1 Mile Scale 1:20000 0 5000 Feet